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# Swine Production In Alberta

BY

DEPARTMENT OF ANIMAL SCIENCE

**FACULTY OF AGRICULTURE**
**UNIVERSITY OF ALBERTA**
**Edmonton, Alberta, Canada**

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**UNIVERSITY OF ALBERTA**
**FACULTY OF AGRICULTURE**

# Swine Production in Alberta

BY

DEPARTMENT OF ANIMAL SCIENCE

Distributed by
Department of Extension, University of Alberta
Edmonton, Alberta, Canada

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## BEAR IN MIND

1. **Pigs will produce more meat from 100 pounds of farm grown feed than any other farm animal.**

2. **The pig will eat and grow and finish on a greater variety of feeds than any other animal on the farm.**

3. **Pigs multiply rapidly so that the money invested in a sow is returned quickly.**

4. **Pigs constitute a reliable source of revenue and provide the farm table with a high class meat product.**

5. **Nearly 18,000,000 hogs were marketed in Alberta during the 10 years 1941 to 1951. This Province is an important contributor to Canada's bacon supply.**

6. **Success in pig raising depends upon the use of good breeding stock of the proper type, together with good feeding and management methods.**

7. **One of the main problems in swine raising in Alberta arises out of the scarcity of skim milk. A proper substitute should be used when milk is lacking.**

8. **Alberta grown grain—oats, barley and wheat—when properly supplemented will produce as good bacon hogs as can be produced anywhere in the world.**

9. **Pigs should be kept year in and year out. Over a period of years they will provide a profitable outlet for farm grown grains and farm by-products.**

10. **Control of disease and parasites is essential to success in pig raising. Diseased pigs or those infested with worms are a liability rather than an asset.**

## PREFACE

Since the swine herd was established at the University of Alberta in 1917, some 15,000 pigs have been farrowed. These pigs have been utilized in a variety of ways. Some have been shipped throughout the Province to assist in improving the quality of commercial pigs; many have served as material for student judging classes, but the majority have been used in the carrying out of experimental work.

During the past 35 years more than 150 swine feeding experiments have been conducted. Information has been gathered on a fairly wide variety of swine feeding problems. The object in conducting these experiments has been to gather information which would be of value to the swine raisers of Alberta and to assist in establishing principles which would have an application to swine raising in any country.

The material which is presented in this bulletin is based in the main on the results of experiments conducted at the University of Alberta. Sections dealing with swine raising equipment and swine diseases have also been included. It is hoped that the bulletin will prove helpful to swine raisers and that it will assist in the direction of better and more profitable hog production in Alberta.

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## AUTHORS' NOTE

The first edition of Bulletin 22, Swine Production in Alberta, was published in 1932. Popular demand for the bulletin dictated the preparation of revised up-to-date editions in 1934, 1937, 1939, 1941, 1945 and 1948. Prior to the release of this, the eighth edition, some 29,000 copies were distributed to farmers and others interested in the swine industry.

Hog producers in this province need not be reminded that for many years the swine experimental work at the University of Alberta was conducted under the direction of the late Dr. R. D. Sinclair, and that he was the senior author of the first seven editions of this bulletin. Much of the material in the present edition is taken from the results of his work. Our debt of gratitude to this man who contributed so much to the welfare of the swine industry and all of agriculture in Alberta is humbly acknowledged.

Representatives of the Canada and Alberta Departments of Agriculture have reviewed Bulletin 22 and offered a number of valued suggestions for its improvement. We wish to thank all who have cooperated in this way.

# Swine Production in Alberta

BY

J. P. BOWLAND and L. W. McELROY

Department of Animal Science

## INTRODUCTION

Since the earliest homesteading days pig raising has constituted a worth-while phase of Alberta's agriculture. Those whose occupation of Alberta's lands preceded the development of established markets found the pig a good source of food supply and a means of converting unmarketable grains into a commodity that had a cash value. We find the pig playing much the same role after approximately sixty years of agricultural evolution in this Province, only in the interval annual revenue from pig sales has risen from a few thousand dollars to many millions and pork products processed in Alberta packing plants find their way to the markets of the world. It may be recorded that during 1944, when Alberta marketed approximately 3,000,000 head of hogs she attained the distinction of being the unit in the British Empire which contributed the largest volume of bacon to the people of Great Britian in a time of great need. Alberta requires approximately 400,000 hogs for her own use. Average annual production over the past 5 years has been slightly in excess of 1,000,000 hogs so that approximately 60% of the total pork produced has been sold outside the Province.

In addition to supplying a high-class meat product the pig is second-to-none as a converter of high grade as well as low grade grains into a concentrated, relatively low freight rate commodity. In times of high grain prices the value of the pig in the farm economy is not usually appreciated, but when prices decline, when quotas limit the amount of grain which can be marketed, or when grades are lowered as a result of frost or other damage the value of this class of livestock is brought markedly to the fore. As will be indicated in the discussion which follows, the Alberta farmer who has kept pigs year in and year out, either as a very minor sideline or as a major part of his farm enterprise, has little reason to be discouraged with the results in terms of financial returns.

The estimated value of the 5,113,773 Alberta hogs marketed during the 5-year period 1947-51 was $222,474,772 or $44,494,954 annually, a sum which is significant in relation to farm buying power.

It is of interest to note Alberta's position in relation to the other provinces in Canada in the matter of swine population. According to the most recent statistics available, the various provinces rank as follows from the standpoint of swine marketed:

TABLE I.—ESTIMATED NUMBER AND VALUE OF SWINE MARKETED IN CANADA, 1951
(including hogs shipped on export)

| Province | Number | Value $ |
|---|---|---|
| Ontario | 2,040,502 | 106,575,419 |
| Quebec | 1,053,876 | 53,821,447 |
| Alberta | 958,143 | 49,411,435 |
| Saskatchewan | 327,926 | 15,619,115 |
| Manitoba | 291,659 | 14,037,548 |
| Nova Scotia, New Brunswick, Prince Edward Island | 192,183 | 9,814,786 |
| British Columbia | 32,827 | 1,821,899 |
| Total | 4,897,116 | 251,101,649 |

It will be observed that in 1951 Alberta stood third among the provinces in Canada in the number of swine sold and it may be suggested that her position is likely to be strengthened in the years that lie ahead. Conditions are favorable for swine raising in the Province from the standpoint of volume, quality and continuity of feed supply, and this type of agricultural production is becoming firmly established, particularly in the mixed farming area. It is important that swine raisers realize Alberta's status in this field because it is clear that they have an important responsibility as contributors to Canadian pork supply for home or export consumption. The volume of live hogs originating in this Province must materially affect the quality of Canadian pork products and it, therefore, behooves Alberta producers to pay careful attention to improvement in quality.

Some idea of the trend of the swine industry in Canada and in Alberta over a period of years may be gathered from a review of the total number of swine marketed at stock yards and packing plants from 1923 to 1951. In order that improvement in quality may be studied in relation to increase in volume, the percentage of "selects" or "A" grade carcasses is submitted, along with volume of marketings, in Table II, which follows:

TABLE II.—TOTAL SWINE MARKETED IN CANADA AND IN ALBERTA AND PERCENTAGE IN TOP GRADE
(Selects, 1923-1940; "A" Grade, 1941-1951)

| | Marketings | | Percent "A" Grade | |
|---|---|---|---|---|
| | Canada | Alberta | Canada | Alberta |
| 1923-32 average | 2,725,763 | 642,728 | 15.8 | 5.4 |
| 1933-42 average | 4,182,084 | 1,239,599 | 25.6 | 24.4 |
| 1943 | 7,149,421 | 2,392,384 | 27.9 | 23.9 |
| 1944 | 8,863,178 | 2,981,940 | 28.3 | 24.3 |
| 1945 | 5,861,073 | 1,946,114 | 32.1 | 27.2 |
| 1946 | 4,460,736 | 1,250,602 | 32.4 | 23.6 |
| 1947 | 4,755,971 | 1,105,222 | 31.7 | 22.0 |
| 1948 | 4,767,860 | 1,165,453 | 31.8 | 23.2 |
| 1949 | 4,429,255 | 924,717 | 31.1 | 22.1 |
| 1950 | 4,775,557 | 960,608 | 32.2 | 25.0 |
| 1951 | 4,894,542 | 957,773 | 31.3 | 25.1 |

A glance at Table II will show that, although there have been wide fluctuations from time to time, there has been a trend towards an increase in the volume of swine marketings in Canada and in Alberta during the past thirty years. The peak reached in 1944 was due, of course, to the demand for bacon to fill contracts with Great Britain and to the comparatively favorable relationship between hog and grain prices. It is evident from the above table that swine production in this province has never been stabilized. Removal of grain marketing restrictions, combined with high grain prices and a shortage of labor and equipment for swine husbandry have contributed to the marked decrease in Alberta swine production since 1944. This occurrence is in line with a general weakness in our swine production program—a tendency to go into and out of the pig business on the basis of a short term view rather than to develop a condition of stability based upon the probable outcome of this particular phase of the farm enterprise over a term of years.

## IS HOG RAISING IN ALBERTA PROFITABLE?

It will be appropriate, early in the discussion of swine production problems in Alberta, to consider whether or not the pig business in this Province is on a sound economic footing. Our interest in what will follow, and in fact our interest in pig raising generally, in terms of a long time program, may hinge on that point. A review of what has taken place in the years which have passed will prove valuable in this connection and may point the way to what may be expected to happen in the years that lie ahead.

In considering the economic status of the hog business, it seems necessary to attempt to relate the cost of production to the selling price over a period of years and thereby show the number of years when hogs have been good property and the number of years when they could be considered a liability.

We have records for the years 1918 to 1951 inclusive. This span of thirty-four years includes periods of world war, post war recovery, prosperity and depression. It would thus appear to cover a sufficient variety of conditions to yield a result which should prove a valuable guide in laying plans in connection with a swine raising enterprise.

Two main factors enter into the cost of producing hogs. In the first place, overhead cost must be considered and in the second place the feed cost is an important item. At the University of Alberta, in an attempt to arrive at the cost of production of 100 pounds live weight of hogs, we have estimated in as practical a manner as possible the overhead cost of producing pork. We have taken four sows as an average farm unit and have calculated on the basis of

seven pigs raised per litter with all sows farrowing in the spring and two farrowing again in the fall, or, in other words, six litters of seven pigs or forty-two pigs marketed during the year. Charging interest at six percent on the money invested in breeding stock, buildings and equipment, and on the value of the land used for pasture, allowing for a 5 and 10% depreciation on buildings and equipment respectively, charging pasture on the basis of cost of seeding and providing for a $3.00 labor return per pig, as well as fair compensation for delivery of pigs to market, we estimated an overhead cost of hog production. This figure has varied from time to time depending upon depreciation in values of breeding stock and other items as well as the labor return. The range has been from a high of $10.06 per market hog during 1951 to a low of $4.30 per hog during the period of the depression.

From the results of numerous experiments with pigs under various conditions, we conclude that 450 lb. of grain or its equivalent are required to produce 100 lb. of live hog. A 200 lb. hog will require 900 lb. of grain; this will make provision for the feed for the sow during the pregnancy and suckling period. Some may feel that this figure should be higher but the figure of 900 lb. will apply where the system of feeding and management is reasonably satisfactory. On farms where proper supplements are not used the figure will run much higher, see page 42.

If the yearly average cash grain price of oats and barley, feeding half and half, is charged to the 450 pound figure, and the overhead figure is added to this, we arrive at the yearly average cost of producing hogs. When this figure is related to the average yearly price of the basic grade of hogs, we can study the cost of production in relation to selling price.

Table III sets out the average yearly selling prices of hogs on the Edmonton market from 1918 to 1951, together with the average yearly costs of production over the same period. In connection with production costs, grain was charged at Edmonton cash grain prices for No. 1 Feed barley and oats. Hog prices were based on the "thick smooth" grade for the years 1922 to 1929, on the "bacon" grade from 1930 to 1940, and on $B_1$ carcass prices converted to live hog prices from 1941 to 1951. Premiums for "selects" or "grade A" carcasses have not been included.

A study of Table III will show:

(1) The average price of the basic grade of hogs on the Edmonton stockyards over the thirty-four year period from 1918 to 1951 was $12.10 per 100 lb. live weight.

(2) The average cost of producing 100 lb. live weight of hog over the same period was $8.86.

TABLE III.—HOGS RETURN A PROFIT

| Year | Selling Price of Basic Grade Hogs | Cost of Production | Difference |
|---|---|---|---|
| | Basis 100 lb. Live Weight | | |
| 1918 | $19.31 | $13.61 | $ 5.70 |
| 1919 | 20.53 | 12.79 | 7.74 |
| 1920 | 18.68 | 14.95 | 3.73 |
| 1921 | 12.11 | 8.34 | 3.77 |
| 1922 | 10.33 | 7.79 | 2.54 |
| 1923 | 8.39 | 7.33 | 1.06 |
| 1924 | 7.45 | 8.50 | —1.05 |
| 1925 | 11.58 | 9.22 | 2.36 |
| 1926 | 12.48 | 8.10 | 4.38 |
| 1927 | 10.08 | 9.66 | .42 |
| 1928 | 9.34 | 9.26 | .08 |
| 1929 | 11.20 | 9.00 | 2.20 |
| 1930 | 10.66 | 6.38 | 4.28 |
| 1931 | 6.01 | 3.94 | 2.07 |
| 1932 | 3.45 | 3.92 | — .47 |
| 1933 | 4.80 | 4.49 | .31 |
| 1934 | 7.45 | 5.62 | 1.83 |
| 1935 | 7.72 | 5.45 | 2.27 |
| 1936 | 7.71 | 5.42 | 2.29 |
| 1937 | 8.15 | 7.08 | 1.07 |
| 1938 | 8.88 | 5.74 | 3.14 |
| 1939 | 8.33 | 4.63 | 3.70 |
| 1940 | 7.81 | 5.51 | 2.30 |
| 1941 | 8.86 | 6.32 | 2.54 |
| 1942 | 10.66 | 8.35 | 2.31 |
| 1943 | 11.70 | 9.30 | 2.40 |
| 1944 | 12.86 | 10.23 | 2.63 |
| 1945 | 13.16 | 10.29 | 2.87 |
| 1946 | 13.88 | 10.47 | 3.41 |
| 1947 | 15.54 | 11.51 | 4.03 |
| 1948 | 21.75 | 12.34 | 9.41 |
| 1949 | 22.95 | 13.70 | 9.25 |
| 1950 | 22.07 | 16.17 | 5.90 |
| 1951 | 25.36 | 15.65 | 9.71 |
| Average | 12.10 | 8.86 | 3.24 |

| | |
|---|---|
| Av. Price No. 1 Feed barley (1918-51): | |
| Marketed through hogs (net) | $0.96 |
| Marketed at elevator | 0.59 |
| Difference | 0.37 |

(3) During this thirty-four year period pigs paid all overhead costs, including interest on breeding stock, buildings and equipment, took care of depreciation, paid a labor return and marketing charges, and provided for a margin of $3.24 per 100 lb. or approximately $6.50 per hog between the cost of production and selling price.

(4) During this thirty-four year period there have been only two years, 1924 and 1932, in which the average cost of production for the year has exceeded the selling price. This condition existed for all 12 months of 1924 and for 9 months in 1932. In the remaining 32 years of this period there have been a total of only 18 months, scattered at intervals, in which the cost of production has exceeded the average selling price.

(5) An alternative method of estimating the profits realized from hogs is to calculate the return obtained for a bushel of grain marketed through the feedlot route and compare this with the cash or elevator price of grain. This estimate has been made year by year on a "net" basis; i.e. after deducting from the gross returns an

overhead charge of from $4.30 to $10.06 per hog to cover items listed in (3) above. The average Edmonton cash price of No. 1 Feed barley over a thirty-four year period has been 59 cents per bushel, whereas this grain was marketed through hogs at 96 cents per bushel. *The barley was increased in value 63% by marketing as pork instead of as grain.*

On the basis of the findings of the study just outlined, it would appear that one may safely state that the swine business in Alberta has been on a sound economic footing. No business can be judged on one year's operations, and there are few enterprises that do not show occasional "loss" years. The Alberta farmer who makes pig raising a part of his regular farming program over a period of years will find the business profitable rather than unprofitable. The individual who attempts to run pigs on the "in and out" plan is very apt to find the results disappointing as he is likely to be in when he should be out and out when he should be in. The "in and out" policy disturbs the marketing situation and gives rise to a condition of instability that is detrimental to the man who is a regular producer. The man who keeps pigs regularly, slightly raising or lowering the number of brood sows as changes in the market may be foreseen, is the one who contributes to permanency in the pig business, and is the one who has a class of stock on hand which can satisfactorily utilize grain of good quality or grain which may have depreciated in quality as a result of some adverse condition. In the latter regard our experiments of recent years have indicated that feed wheat can be fed very successfully and in 1951, despite the fact that the carcass quality of pigs fed wheat was not as high as that of pigs fed barley, frozen wheat was marketed through hogs at $2.15 per bushel.

**Value of Efficient Feeding**

When the feed requirement is lowered as a result of efficient feeding, the net price received for grain is increased and, on the other hand, when the amount of feed required is high, a lower price is returned.

As a guide to the net returns which may be expected for grains when hogs sell at variable prices, and in order to indicate the influence on returns of the amount of feed required to produce 100 pounds of live weight gain, Table IV is submitted. An overhead charge of $5.00 per 100 lb. of live hog was used in calculating the net returns shown in this table.

**Scale of Operations**

As a general rule the pig business is subsidiary to some other branch or branches of the farm enterprise, and it would seem that

the greatest returns are to be secured from pigs when they occupy this position. When only a few sows are kept a considerable portion of the feed supply is in the nature of "odds and ends" about the farm, and the grain allowance is supplemented by a certain amount of dairy by-products or household refuse. Under such conditions the feed bill to be charged to the pigs is not heavy and good returns can be readily calculated. It is a mistake to estimate that twenty sows will give twenty times the returns that one sow will, for when the numbers are multiplied the drain on the grain supply is heavier, and in order to compensate for the scarcity of milk and household garbage, supplementary feeds must be purchased in quantity. At the same time, even when the higher grades of grain are fed, and supplementary feeds are utilized, fairly large scale pig raising can be profitably carried on over a period of years. The inexperienced pig raiser will, however, be well advised to carry on in a small way until he has a chance to study the efficiency of his methods in the light of the returns which he is securing.

TABLE IV.—NET RETURNS FOR GRAIN WHEN MARKETED THROUGH HOGS

| | $ | $ | $ | $ |
|---|---|---|---|---|
| Market price of hogs—per 100 lb. live weight | 12.00 | 16.00 | 20.00 | 24.00 |
| Market price of hogs—per 100 lb. dressed weight | 16.00 | 21.35 | 26.65 | 32.00 |
| Net returns for grain allowing 400 lb. of grain or its equivalent for 100 lb. live weight gain: | | | | |
| Net value per bushel grain fed: | | | | |
| Wheat | 1.05 | 1.65 | 2.25 | 2.85 |
| Oats | .60 | .94 | 1.28 | 1.62 |
| Barley | .84 | 1.32 | 1.80 | 2.28 |
| Net returns for grain allowing 450 lb. of grain or its equivalent for 100 lb. live weight gain: | | | | |
| Net value per bushel grain fed: | | | | |
| Wheat | .93 | 1.47 | 2.00 | 2.53 |
| Oats | .53 | .83 | 1.13 | 1.44 |
| Barley | .75 | 1.17 | 1.60 | 2.03 |
| Net returns for grain allowing 500 lb. of grain or its equivalent for 100 lb. live weight gain: | | | | |
| Net value per bushel grain fed: | | | | |
| Wheat | .84 | 1.32 | 1.80 | 2.28 |
| Oats | .48 | .75 | 1.02 | 1.29 |
| Barley | .67 | 1.06 | 1.44 | 1.82 |

## Monthly Variations in Marketing

A situation which affects the business of processing hogs and presents a problem in connection with continuity of supply of pork products for export is the irregularity of volume of hogs being marketed from month to month. As a general rule, a much larger number of hogs is marketed during the fall and early winter months than during the summer months. Regularity of supplies is very desirable, and anything that can be done in connection with arranging for farrowing fairly steadily throughout the year will contribute to an even flow of hogs to the packing plants. There has been considerable improvement in Alberta in this respect during recent

years. Better farrowing quarters, treatment for anemia and inside feeding have all contributed to this betterment in our performance. We must continue in our efforts to still further improve our position in this respect. The only practical way to compensate for monthly fluctuations in slaughterings is to put bacon in cold storage and this will lead to a lowering of the net returns.

## QUALITY AND MARKET OUTLETS

A matter of great concern in connection with the production of any class of livestock is that of available markets for the product.

From 1945 to 1948 the average annual consumption of pork in Canada was approximately 50 pounds per person. By 1951 domestic use of pork had risen to an all-time peak of 67.8 pounds per capita, for a total of almost 950,000,000 pounds, or the produce of 6 1/3 million market hogs. These figures are significant in that they emphasize the importance of our home market. They also point up the sharp increase in the average per capita consumption of pork in Canada during recent years; this increase has been due largely to a combination of two factors, high consumer incomes and low prices for pork in relation to those in effect for beef. These are important factors in connection with the question of the type of hog to be produced in this country.

The Canadian consumer prefers lean cuts of pork and bacon. Possibilities in the way of export markets are at present uncertain but there is nothing to indicate that satisfactory export outlets can be developed on anything other than a quality basis.

A drop in level of income or beef prices or in both would not simply lead to lower hog prices, but to a greater emphasis by consumers on high quality pork with a minimum of excess fat. Packers can, to a degree at least, make a lean carcass from a fat one by trimming off surface fat, but fat is, and appears destined to continue to be something of a drug on the market. Processed lard has for some time been selling for less per pound than it cost as carcass fat. In the final analysis the consumer makes up the difference by paying more for table pork.

In periods of high income and high prices for competitive meats Canadian swine producers may be able to enjoy the luxury of producing fat hogs, but under less favorable conditions it seems evident that they must continue to concentrate on the production of hogs that can be processed into attractive bacon and cuts of pork with a minimum of waste in the form of fat trimmings. Good breeding stock, balanced rations and marketing at desirable weights are three important factors in the production of hogs that meet this requirement.

## A Wiltshire Side

The term "Wiltshire," unlike Yorkshire or Berkshire, does not refer to a breed of pig but to a particular style of dressing the hog carcass. A "Wiltshire side" is one-half of the carcass of a pig with head, feet, shoulder blade, leaf-lard, tenderloin, neck bone, back bone, tail bone and minor trimmings removed. An average 200 pound hog will yield approximately 150 pounds of warm carcass weight and 145 pounds of cold carcass weight. When the carcass is split and trimmed it will yield two Wiltshire sides of about 57 to 58 pounds in weight.

Britain's bacon trade in normal times centers very largely around the Wiltshire side and when this product is properly cured and smoked it constitutes an attractive article.

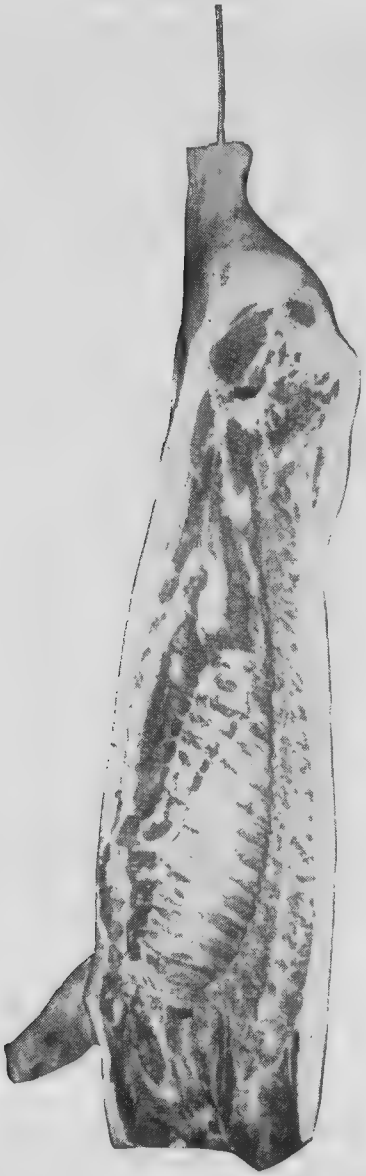
Wiltshire sides such as shown in Fig. 1, page 16, are packed four to a bale, and since they receive only a comparatively mild cure in Canada, must be shipped to Britain with the least possible delay.

## Type of Pig Required

Since the demand of the domestic and export markets alike is for pork products carrying a high percent of lean meat it seems clear that our aim should be the production of pigs of the bacon type. Pigs of bacon type are recognized universally as the only kind which can be utilized satisfactorily in the production of lean pork, and in a country such as Denmark, which has for many years dominated the British bacon market, pigs of this type are the only kind which farmers are permitted to raise.

In general type, bacon hogs are slightly long of leg, a feature which gives them a style and alertness not found in pigs of the old lard, or butcher type. The bone must be strong and clean and the pig must stand up well on its pasterns. Length of side is a feature of prime importance, and this length is estimated from just behind the shoulder to the hip joint. The shoulder must be smooth, showing no tendency to bulge on the side; an even arch of back from neck to tail without heaviness at the neck or "crest" indicates uniformity of fleshing, and an evenness of width throughout the body suggests good development of back, loin and ham in relation to shoulder.

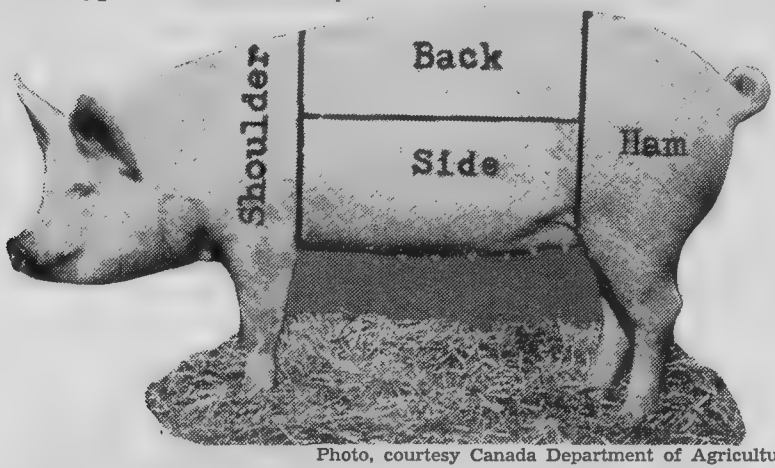
The bacon hog should show fair depth of body in order to insure good feeding capacity. Constitution is indicated by depth and width of chest and by ample clean, hard bone. Freedom from excess fat at the jowl, underline, and ham facings insures a leanness of carcass and freedom from waste which is highly desirable. Bacon hogs of this type killed at weights of from 190 to 210 pounds produce bacon and pork cuts of acceptable quality and weight. Hogs of this type



Photo, courtesy Canada Department of Agriculture.

**Fig. 1.**—Wilshire side. Note the length from hip bone to first rib, symmetrical side, and uniform depth of back fat.

are economical feeders, and are admirably adapted to make use of the kind of cereals which are raised on the farms of Alberta. Experimental evidence is at hand to show that pigs of correct bacon type grow as well and do not require any more feed than pigs of a thicker type.




Photo, courtesy Canada Department of Agriculture.

**Fig. 2.**—A pig of grade "A" type. Note the smooth, light shoulder; long, moderately arched back; deep, straight side; and full, trim ham. Pigs of this type are economical feeders and produce retail cuts which meet the requirements of a discriminating market. This gilt has 8 generations of Advanced Registry breeding in her pedigree—see pages 25-27.

## Bacon Type Breeding Stock

*Sow*

If market hogs of the proper type are to be produced, the breeding stock must show the characteristics desired in the offspring to be sold. The type of pigs marketed will depend very largely on the class of sow kept and the type of boar to which she is mated. Whether purebred or grade, a sow should be selected out of a litter of good size and preferably from a sow of good disposition and possessing good milking qualities. Bacon type sows must show plenty of length of side and at the same time sufficient depth of body to insure good feeding and breeding capacity. Strength of constitution should not be sacrificed for length since extremely long, shallow sows tend to produce late-finishing pigs. Young bacon type sows should show good fleshing qualities and must stand straight in the pasterns.

A good sow possesses twelve or, better still, fourteen teats; lack of mammary development is a main limiting factor in the production of large litters. She is feminine in appearance and free from any tendency towards coarseness or "stagginess".

*Boar*

A purebred boar should always be used, and in selecting a boar the type of sows to which he is to be mated should be given careful consideration. If the sows show exceptional length and a tendency towards lack of constitution, a boar of moderate length but possessing a strong constitution is needed. Likewise, if the sows lack length, this feature should be a dominant characteristic of the boar selected. In the main, the bacon type boar should be masculine, show a ruggedness of bone without coarseness, good length with strength of constitution, together with strength of top and smoothness and evenness throughout. It should be borne in mind that boars of the proper type are a very important factor in improving the quality of commercial pigs, since a boar may be mated to a large number of sows, and for that reason great care should be taken in the selection of this member of the herd.

Photo, courtesy Alberta Department of Agriculture.

**Fig. 3.**—A purebred boar should always be used. This Yorkshire boar has a long, deep, symmetrical body, supported on clean-cut legs of medium length.

## Inherited Defects

In selecting breeding stock care should be exercised to choose from litters which do not contain any individuals showing ruptures, ridglings or hermaphrodites. These conditions are hereditary and can be eliminated in a herd only by selecting from strains which are free of such defects.

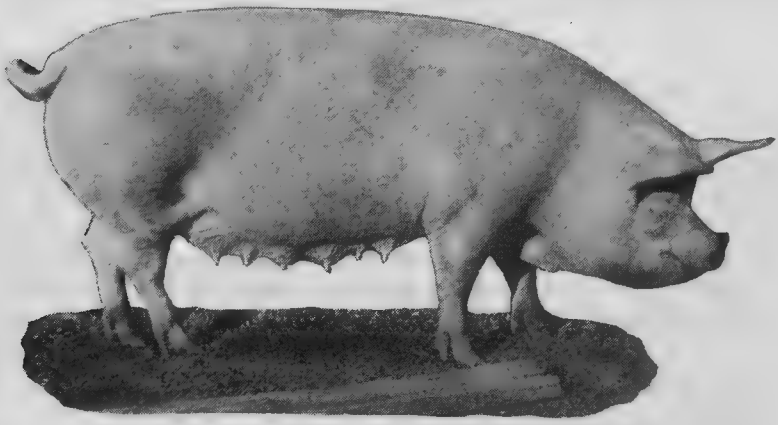
## THE BACON TYPE BREEDS

The matter of type is probably of greater importance than the breed in the selection of breeding stock, yet it is well to consider the merits of the various breeds so that an intelligent selection may be made. A good many breeds of American and European origin have made their appearance in Alberta, but it is generally recognized that the only breeds which are likely to produce a high percentage of pigs of correct bacon type are the Yorkshire, Tamworth and Berkshire. Colored breeds, including Tamworths and Berkshires, are discriminated against because of their tendency to produce carcass waste in the form of "seedy" bellies.

### The Yorkshire

The Yorkshire breed is recognized as the premier bacon breed in Canada and is extensively used in most countries where the aim is bacon production. In Eastern Canada the Yorkshire has long been a popular breed, but it was not until the Canadian Government's hog grading policy was introduced in 1922 that the Yorkshire became popular in Alberta. Since the general introduction of Yorkshire breeding stock following that date, a marked improvement in the quality of the pigs being marketed has been noted. In all of the provinces of Canada the Yorkshire far outnumbers all other breeds combined.

The Yorkshire is a pure white breed, black hair and skin spots being objectionable. The breed is noted for its size, mature boars weighing from 700 to 800 pounds and mature sows from 600 to 700



Photo, courtesy Alberta Department of Agriculture.

**Fig. 4.**—A Yorkshire sow. Length of side, depth of body and a well developed mammary system are important points in the selection of brood sows. Pigs from this sow made an average carcass score of 87% under Advanced Registry Test.

pounds. Length of body is a prominent characteristic of the breed. Yorkshire sows are generally very prolific, and as a rule have the necessary mammary development to nurse large litters. Certain strains of Yorkshires tend to lack somewhat in constitution and feeding qualities; a susceptibility to sunscald under certain conditions has made the breed unpopular on some Alberta farms.

When Yorkshires possessing not only length of body, but strength of constitution as well are selected, and simple though definite precautions are taken to prevent sunscalding, there appears to be no doubt that this breed provides the surest means of attaining the production of a high percentage of grade A bacon hogs.

*"English" Yorkshire*—The Large White or "English" Yorkshire is currently enjoying some popularity in Canada. "English" and "Canadian" Yorkshires trace to the same foundation stock and are in fact the same breed. They are simply different strains developed under different conditions. Time and experience will prove whether the strain developed in England is well adapted to our conditions.

The evidence to date suggests that the outcross between individuals of the English and Canadian strains yields pigs of good quality and thrift. The thrift and fast growing characteristics of such "first-cross" pigs from different strains of one breed may be explainable on a basis of outcross vigor similar to the hybrid vigor obtained by mating pigs of different breeds such as the Yorkshire and Tamworth. If such is the case, outcross progeny retained in the breeding herd may prove somewhat disappointing in that their offspring may lack uniformity and have no more vigor than pigs from either of the pure parent strains.

### The Tamworth

The Tamworth is one of the oldest breeds of pigs, and has been noted from the beginning as a producer of good quality bacon. A golden red is the typical color; black skin and hair spots should be eliminated. As a breed, the Tamworth is scarcely as large as the Yorkshire, although boars will weigh from 600 to 700 pounds and sows from 500 to 600 pounds when mature.

Tamworth pigs show a good depth of side, but as compared with Yorkshires lack somewhat in length of side and tend to be light in the hindquarters. On the whole, however, the Tamworth seems to possess good fleshing of back and loin, and it is rare for pigs of this breed to lack the necessary finish at weights from 200 to 210 pounds.

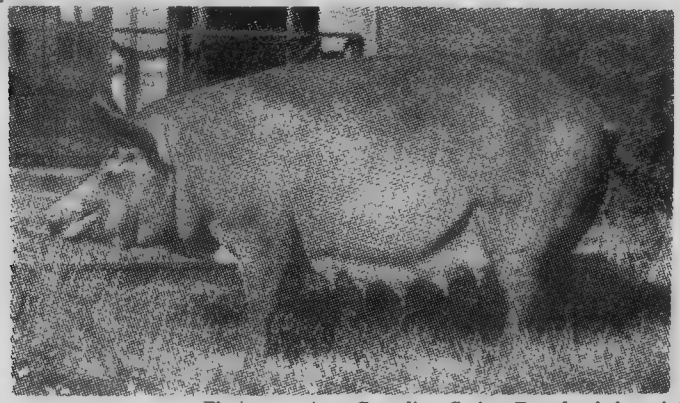
Tamworth sows, as a rule, are not so prolific as Yorkshires, and young sows especially are inclined to give rather small litters. Improvement in prolificacy is a requirement of the breed at the present time. The following table shows the relative size of litters of the

three breeds under discussion. The figures presented are compiled from our farrowing records at the University of Alberta for the years 1922 to 1940 inclusive:

TABLE V.—AVERAGE SIZE OF LITTERS OF VARIOUS BREEDS

| | No. of Farrowings | Total Pigs Farrowed | Av. Size of Litter |
|---|---|---|---|
| Yorkshire | 482 | 5,285 | 11.0 |
| Tamworth | 518 | 4,669 | 9.0 |
| Berkshire | 169 | 1,404 | 8.3 |

The swine raiser who is aiming to produce hogs of the bacon type and who objects to the white color may well select the Tamworth as a breed with many splendid qualities. In selecting pigs of this breed, length as well as development of hindquarters should be kept in mind.



Photo, courtesy Canadian Swine Breeders' Association.

Fig. 5.—A Tamworth sow.

### The Berkshire

The Berkshire has never been recognized as a bacon breed, but what is known as the Canadian type Berkshire has been developed along bacon lines. Certain breeders have developed a type which shows sufficient length to yield carcasses of passable type, but the black color is a limiting factor in the use of this breed for purposes of bacon production in view of the objectionable skin color and the tendency toward the production of "seedy" bacon. Berkshires may be crossed with Yorkshires to produce white pigs of bacon type.

### Other Breeds

From time to time a few Canadian breeders import pigs from such breeds as the Duroc-Jersey, Poland-China, Chester White, Hampshire and others. In some cases these perform satisfactorily for a few years but seldom do they produce a high percentage of bacon type carcasses. This is understandable when it is considered that these breeds were developed under conditions where bacon type

Photo, courtesy Canadian Swine Breeders' Association.

**Fig. 6.—A Berkshire boar.**

was not of first importance. They too often lack length and are too fat according to Canadian standards.

A number of new breeds with some bacon type ancestry have been developed recently in the United States. These are the Minnesota No. 1, Minnesota No. 2, Hamprace or Montana No. 1, Maryland No. 1, Beltsville No. 1 and Beltsville No. 2. Of these the most promising from the bacon type point of view appears to be the Minnesota No. 1. However, tests conducted at the Lacombe Experimental Station indicate that the Minnesota No. 1 is inferior to the Yorkshire in carcass quality and lower in weaned litter size. This latter seems to be the result of a lower vitality or survival rate of the breed under our conditions. Canadian breeders may be well advised not to make extensive use of these new breeds until they have been further tested under our conditions.

## SWINE IMPROVEMENT POLICIES

In an endeavor to standardize the type of hogs reaching Canadian markets and to encourage the general production of pigs conforming to the bacon type, certain Federal and Provincial Government swine policies have been put into effect. Such policies are common to all countries concerned with catering to an exacting export market, and it should be borne in mind by Alberta swine producers that practically all European countries exercise very rigid government control over the swine industry. Such control is considered absolutely necessary if a standardized, high-grade article is to be secured. The view is held that any breed, breeding method, or feeding method which is detrimental to the general uniformity of the export product, must be eliminated for the common good. Most

of these considerations also apply to the production of pork products for a discriminating domestic market.

## Carcass Grading of Hogs

Chief among the policies having as their object the improving of the quality and standardizing the weights of Canadian pork products is the Canada Department of Agriculture plan of carcass grading of hogs.

The general plan of hog grading which was put into effect in 1922 had as its object the grading by official Government graders of all hogs offered at Canadian stock yards and packing plants, and the payment of a premium for pigs of the type, weight and quality suitable in the production of the highest grade of export bacon.

All hogs were graded alive until 1934, at which time an alternative plan of selling hogs on a basis of carcass grade was made available to producers. From 1934 to September 1940, the swine raiser had the option of selling his hogs according to "live" or "carcass" grade. During this period the percentage of hogs graded in the carcass increased annually as producers became acquainted with carcass grading procedure and the advantages which the system offered to the producer of hogs of top quality. According to official figures, during the first nine months of 1940 approximately 65% of the hogs marketed in Canada were carcass graded under the optional system.

Commencing with October, 1940, carcass grading of hogs became the official system and live grading was discontinued.

Full particulars regarding the application of rail grading may be obtained from the Livestock and Livestock Products Division, Marketing Service, Department of Agriculture, Ottawa, or through the Supervising Grader at the Calgary and Edmonton Stockyards.

For the convenience of readers of this bulletin, the official hog carcass grades in effect at the time of publication are set out as follows:

STANDARD FOR GRADES OF HOG CARCASSES

(a) Weight Ranges and Carcass Measurements

| | | | |
|---|---|---|---|
| **GRADE "A":** | | | |
| Weight | | | 140-170 lb. |
| Minimum length | | | 29" |
| Maximum shoulder fat | | | 2" |
| Maximum loin fat | | | 1½" |
| **GRADE "B":** | **Class 1** | **Class 2** | **Class 3** |
| Weight | 135-175 lb. | 125-134 lb. | 176-185 lb. |
| Min. length according to weight | 28"-29" | 27" | 30" |
| Max. shoulder fat according to wt. | 2"-2¾" | 2" | 2¾" |
| Max. loin fat according to wt. | 1½"-2" | 1½" | 2¼" |
| **GRADE "C":** | | | |
| Weight | | | 120-185 lb. |
| Max. shoulder fat according to wt. | | | 2¼"-3¼" |
| Max. loin fat according to wt. | | | 1¾"-2½" |
| **GRADE "D":** | | | |
| Weight | | | 120-185 lb. |

and underfinished, rough, soft or oily carcasses of any weight.

LIGHTS—Weight 119 lb. and under.
HEAVIES—Weight 186 lb. to 195 lb.
EXTRA HEAVIES—Weight 196 lb. and over.
PHYSICAL INJURY—All weights.
RIDGLINGS—All weights.
STAGS—All weights.
SOWS, Class 1—All weights.
SOWS, Class 2—All weights.

REJECTED or CONDEMNED CARCASSES shall be graded in accordance with the above grades, and in addition shall be shown separately on the Grading Certificate as Rejected or Condemned.

**(b) Grade Standards**

GRADE "A":
All carcasses shall be of best quality.
Shoulder—Shall be balanced in weight in relation to the ham.
Belly—Thick and of even width throughout, with full flank.
Ham—Full fleshed, evenly covered with fat of good shape.
Back—Fat firm and of even thickness within variation allowed.
Quality—Fat firm and white with proper balance of fleshing and fat in carcass throughout. Skin shall be smooth and show no marked evidence of dark hair roots or pigment.

GRADE "B":
Grade "B" may vary from Grade "A" in any weight class as follows:
Classes 1 and 3—
Shoulder—Slightly heavy or slightly fat.
Belly—Slightly thin or fat or wide.
Ham—A little thin or slightly fat.
Back—Fat slightly uneven on back or slightly deficient or a little overfat throughout the carcass.
Quality—Fat a little soft or somewhat out of balance between lean or fat.
Class 2—
Shoulder—Slightly heavy.
Belly—Thin or uneven.
Ham—A little thin.
Back—Fat slightly uneven on back or slightly deficient.
Quality—Fat a little soft.

GRADE "C":
Shall be well finished and of good quality of fleshing, but may vary from Grade "B" by including a greater degree of fat to lean, softness and unevenness of fat, heaviness of shoulder and roundness or rib.

GRADE "D":
May contain overfat, unfinished, rough, soft or oily carcasses.

LIGHTS:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or under-finished carcasses.

HEAVIES:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or under-finished carcasses.

EXTRA HEAVIES:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or under-finished carcasses.

PHYSICAL INJURY:
Carcasses that have suffered serious physical damage.

RIDGLINGS:
Carcasses from ridgling pigs.

STAGS:
Carcasses from boars which have been castrated and healed.

SOWS:
All females that have raised one or more litters.
Class 1—Carcasses of good fleshing throughout.
Class 2—Carcasses that are overly fat or very thin.

REJECTED OR CONDEMNED:
Carcasses that are rejected or condemned by the Veterinary Inspector on account of disease shall be graded Rejected or Condemned.

## METHOD OF MEASUREMENT

Measurement for the length of the carcass shall be taken from the front edge of the first rib to the inside of the aitch bone.

Fat measurements shall be taken as follows:
Maximum shoulder—At the point of maximum fat thickness on the shoulder, except for any small fat infiltration into the lean.
Maximum loin—At the point of maximum fat thickness on the loin between the last rib and the tail.

Carcass weights shall be "Warm Weights," including the head, leaflard, the tongue, kidneys, tenderloins, tail, backbone and feet.

Whip marks, scratches, and bruises shall not be a factor in determining grade except those graded as serious physical damage.

**Price and Grade**

The price paid for hog carcasses varies according to grade. Payment according to grade offers some reward to the producer who markets a top quality product and tends to discourage the production of hogs which yield carcasses unsuitable for the best bacon trade.

The original agreement when live hog grading was started in 1922 called for the payment of a 10% premium on "selects" over "thick smooths". This arrangement continued until 1929 when the live grades were modified. At this stage the basis for paying the premium was revised to a straight increase of 50c per hundredweight for "selects" over pigs of the second grade "bacon". When carcass grading commenced in 1940 the premium was set at $1.00 per carcass for "A" grade as compared with the basic price for "B" grade carcasses. The lower grades were subject to standard price discounts.

Commencing with January, 1944, a further revision in the system of paying premiums and levying discounts was put into effect. The $1.00 premium paid by packers for Grade A carcasses became a part of the price paid for carcasses of that grade. The spread in price between grades is based on the carcass grade value for domestic consumption. The price differentials on "A" and "$B_1$" grades are subject to the approval of the Canada Department of Agriculture.

From 1944 to 1947 the Canadian Government premiums were $3.00 for "A" grade and $2.00 for "$B_1$" grade carcasses. Since 1947 these premiums have been $2.00 and $1.00 for "A" and "$B_1$" grades respectively.

**Advanced Registry for Swine**

A Canadian Government National Policy, known as Advanced Registry for Swine, is making an important contribution to swine improvement. This Policy offers the purebred swine breeder, through testing, a method of evaluating the utility value of sows and boars.

The test provides information basic to the improvement of strains or families of swine. Emphasis is placed on the following characteristics of the progeny of a mating: litter size, early maturity, feed consumption per pound gain, and carcass quality. The photographs shown in Fig. 7, 8, and 9 on page 26 are furnished through the courtesy of the Edmonton office of the Livestock Production Services. They illustrate a few of the important points that Advanced Registry studies have clarified regarding relationships that exist between the appearance of a live hog and quality of carcass.

The breeder of sows and boars qualifying under this Policy is

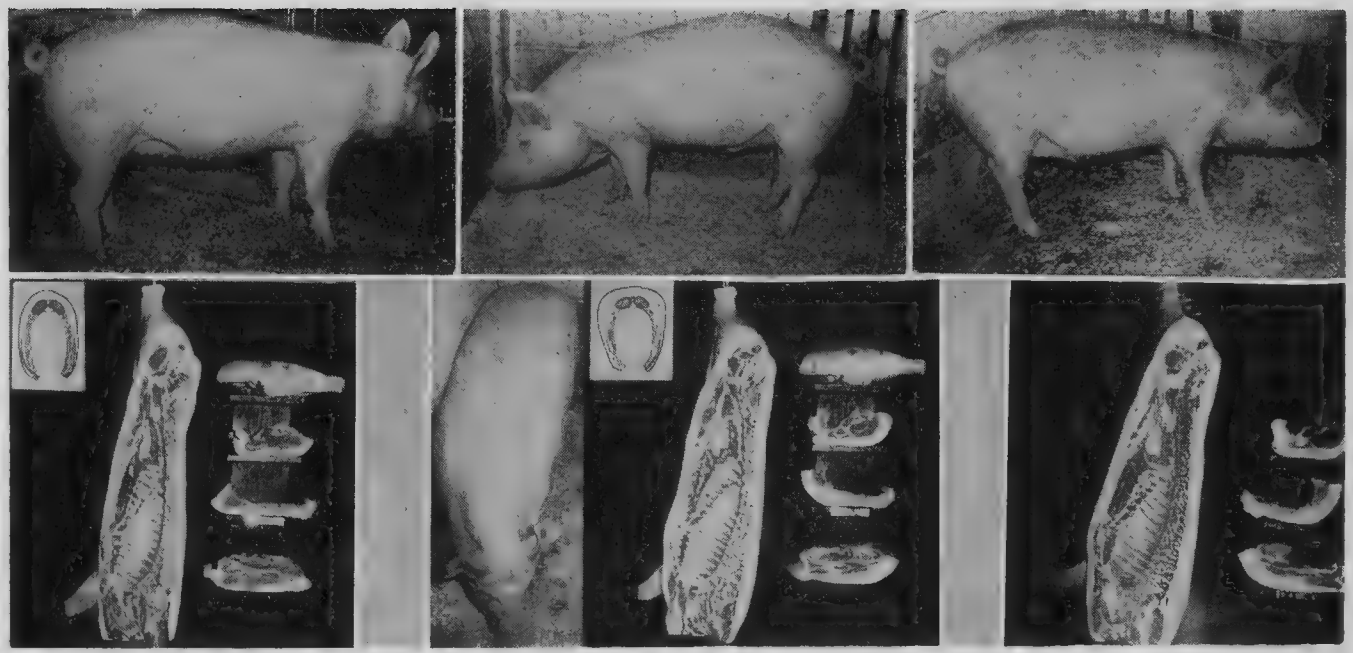


Fig. 7.—The A. R. Carcass Score on this "A" grade pig was 93. The inset is a sketch of a carcass cross section at the middle of the back. Note that an oval shape is associated with a moderate even cover of fat and a large eye of lean.

Fig. 8.—The A. R. Carcass Score on this "B" grade pig was 46. Note from the inset that a "strong" square back is associated with excess fat at the break of the rib, not with a large eye of lean.

Fig. 9.—The A. R. Carcass Score on this "C" grade pig was 21. The carcass carried even more waste fat than that of the pig shown in Fig. 8 and in addition was almost 3″ shorter.

in a position to supply superior breeding stock to other purebred breeders and to commercial producers.

Advanced Registry testing is national in scope with the same standards applied from coast to coast, and for the Province of Alberta a Testing Station is in operation near the City of Edmonton. Information regarding this Policy may be obtained from the District Fieldman, Livestock Production Services, Canada Department of Agriculture, Edmonton.

**Other Federal Swine Policies**

In addition to the policies discussed, the Canadian Government has in operation a number of other swine improvement policies. These include gilt culling, sire purchase and the loaning of boars to Junior Swine Clubs and Swine Improvement Associations. Farmers interested in taking advantage of any of these forms of assistance are advised to communicate with the District Fieldman, Livestock Production Services, Canada Department of Agriculture, Edmonton.

**Provincial Swine Policies**

The Alberta Department of Agriculture, through the Live Stock Branch, offers the Swine Improvement Policy for the placement of purebred sires. It is designed to assist in supplying approved sires in particular to commercial swine producers in the province. Under this Policy transportation charges are paid on Government-purchased purebred bacon type boars to the nearest shipping point of the applicant.

Applicants for sows and those who are not eligible for boars under the Swine Improvement Policy may obtain breeding stock through the Live Stock Listing Bureau. This plan does not provide for free transportation.

General assistance on the subject of breeding, feeding and management of swine is provided to all swine growers and breeders by the Live Stock Branch, Department of Agriculture, Edmonton, and by District Agriculturists representing the Department at various points throughout the province.

**Swine Clubs**

Among the agencies which have been responsible for marked improvement in the quality of Alberta hogs are the 4H Swine Clubs. These clubs, which are supported by both Federal and Provincial Governments, not only interest the young people in raising good pigs, but are centers of swine improvement which work into extensive areas. Communities interested in organizing a swine club may secure information regarding this movement from the Supervisor of 4H Clubs, Department of Agriculture, Edmonton, or from their nearest District Agriculturist.

# Feeding and Management of Swine

In connection with swine raising, considerable progress has been made when the correct type of breeding stock has been secured, but the ideal in bacon hog production will not be attained unless the best feeding and management methods are followed. Unless the breeding stock is maintained in vigorous condition and the young pigs are kept growing rapidly from the start on well balanced feeds, the "pork making machinery" is not likely to function efficiently. The aim in the pig business should be the marketing each year of a maximum number of high quality pigs on a minimum amount of feed, or, in other words, economical production.

During the past thirty-five years more than 150 swine feeding experiments have been conducted at the University of Alberta. The main objects of these experiments have been to study rations, supplementary feeding, and methods of feeding with a view to determining the practices which will produce an acceptable type of pig at the lowest possible feed cost, and during a feeding period of minimum length. It will be the object of the discussion which follows to present to swine raisers a review of swine feeding and management problems based on the results of experiments conducted at the University of Alberta, with the hope that it may be of some service, particulary to those who may have had comparatively little previous experience with hogs.

## COMPOSITION OF COMMON SWINE FEEDS

Before commencing a discussion of feeding and management practices, however, it should be of interest to consider some facts relative to the composition of common swine feeds and to draw some general comparisons between the various feeds available to Alberta swine producers.

A very good idea of the comparative value of various feeds may be secured by subjecting them to a chemical analysis. The chemist groups the various components of feeds under the following headings: water, ash, protein, fiber, carbohydrates and fat. The constituents of oats, for example, are grouped in this way because each of these groups plays a definite and different part in connection with body up-keep and growth.

The water content is determined because the less moisture a feed contains the higher its feeding value, pound for pound. Cereals

which are damp or tough do not return as good value for each 100 pounds fed as those of lower moisture content.

The ash contains the mineral constituents of the feed, and unless additional mineral matter is fed, the ash forms the only source of supply of mineral for the animal. The ordinary farm-grown grains are very low in ash. The hays and grasses contain more ash, with legumes, such as alfalfa and the clovers, being very rich in mineral matter, especially calcium. Since pigs are fed heavily on cereals, it is necesary to pay careful attention to mineral supplements.

The protein contains all the nitrogenous compounds, and this part of the feed is used to produce lean meat, body tissue, hair, skin, hoof, etc. The demand for protein is very heavy in young growing pigs, pregnant sows and sows nursing litters. The bacon hog, which is a producer of lean meat, requires a plentiful supply of protein-rich feeds. Such feeds as skim milk, meat scrap, linseed oil meal, fish meal and soybean oil meal are rich in protein.

The fiber is the part of the feedstuff which is of least use to the pig. Oat hulls consist largely of fiber and are to a large extent indigestible. Cattle and sheep can make considerable use of fibrous feeds because they have a large paunch and chew the cud, but the pig with its small stomach, can make little use of high fiber feeds. This is a point to be borne in mind in pig feeding.

The carbohydrates compose the starchy portion of the feed, and are largely used to supply the heat and energy required by the pig and for the production of fat in the body. All cereal grains are rich in carbohydrates.

The term fat, when used in connection with the composition of a feed, embraces not only true fat but certain fat-like substances. The fat is used largely for the same purposes as the carbohydrates, namely, heat and energy and the production of body fat. If a feed is very rich in oils, especially those of a soft nature, it may adversely influence the quality of fat in the carcass. None of the feeds commonly used in Alberta, with the possible exception of oats, is likely to cause any trouble in this respect.

A table setting out the percentage composition of various feeds may constitute a valuable guide in arriving at relative values, and for that reason the following table is submitted. A large number of chemical analyses have been made of the common feeds and reliable average figures have been obtained.

*PERCENTAGE COMPOSITION OF SOME COMMON SWINE FEEDS

| | Water | Ash | Protein | Fiber | Carbo-hydrates | Fat |
|---|---|---|---|---|---|---|
| | % | % | % | % | % | % |
| Barley | 10.6 | 2.8 | 12.7 | 5.4 | 66.6 | 1.9 |
| Oats | 9.8 | 4.0 | 12.0 | 11.0 | 58.6 | 4.6 |
| Wheat | 10.6 | 2.1 | 13.5 | 2.8 | 69.2 | 1.8 |
| Corn, Dent | 15.0 | 1.2 | 8.6 | 2.0 | 69.3 | 3.9 |
| Rye | 10.5 | 1.9 | 12.6 | 2.4 | 70.9 | 1.7 |
| Bran | 9.9 | 6.1 | 16.9 | 9.6 | 52.9 | 4.6 |
| Skim milk | 90.5 | 0.7 | 3.6 | 0.0 | 5.1 | 0.1 |
| Meat scrap | 6.2 | 28.2 | 46.1 | 2.1 | 4.7 | 12.7 |
| Fish meal | 7.1 | 17.6 | 63.9 | 0.6 | 4.0 | 6.8 |
| Soybean oil meal | 9.1 | 6.0 | 44.3 | 5.7 | 29.6 | 5.3 |
| Linseed oil meal | 9.0 | 5.6 | 35.0 | 8.3 | 36.4 | 5.7 |
| Potatoes | 78.8 | 1.1 | 2.2 | 0.4 | 17.4 | 0.1 |
| Dehydrated alfalfa meal | 6.4 | 9.5 | 18.9 | 24.3 | 38.1 | 2.8 |
| Alfalfa hay | 9.5 | 8.2 | 14.8 | 28.9 | 36.6 | 2.0 |
| Mixed grass pasture | 71.8 | 2.4 | 4.7 | 7.3 | 12.3 | 1.5 |
| Oat pasture | 86.0 | 2.0 | 3.2 | 2.8 | 5.4 | 0.6 |

*From Morrison's "Feeds and Feeding," twenty-first edition.

## SWINE FEEDS AVAILABLE IN ALBERTA

A knowledge of the comparative values of the various feeds suitable for pig feeding should be of assistance in connection with planning a cropping scheme or in getting the greatest value for money spent when feed has to be purchased. The discussion which follows, when considered in conjunction with the figures dealing with chemical composition should form a basis for evaluating the common swine feeds.

### Grains and Grain By-products

#### Barley

Barley has long been regarded as a desirable finishing feed for pigs in this country. Of recent years we have conducted a number of experiments with a view to determining the place of barley in the ration of young growing pigs, and we are led to conclude that a much larger percentage of barley than was formerly thought possible may be fed to advantage. It has been our experience that the higher the percentage of barley in proportion to oats fed, the less feed is required to make growth, and the larger the returns for feeding. In this connection an average result of three experiments conducted during the years 1926-27-28 is presented. In these experiments the various grain mixtures were fed in conjunction with skim milk to pigs running on pasture.

The results of these experiments appear to justify the conclusion that for bacon hogs, when the cropping scheme favors the growing of barley, or when the relative price of barley versus oats is in favor of barley, a higher proportion of barley than has been common may be safely and economically fed.

TABLE VI

RESULTS OF FEEDING VARIOUS MIXTURES OF OATS AND BARLEY

| | LOT I Oats 2 Barley 1 | LOT II Oats 1 Barley 1 | LOT III Oats 1 Barley 2 | LOT IV Oats 1 Barley 3 | LOT V Barley Alone |
|---|---|---|---|---|---|
| No. of pigs | 20 | 20 | 20 | 20 | 19 |
| Av. initial weight lb. | 35.7 | 36.1 | 36.2 | 36.2 | 35.8 |
| Av. final weight lb. | 205.4 | 203.0 | 203.1 | 203.1 | 205.0 |
| Av. daily gain lb. | 1.28 | 1.31 | 1.33 | 1.35 | 1.37 |
| Feed req'd for 100 lb. gain: | | | | | |
| Grain lb. | 298 | 296 | 288 | 288 | 285 |
| Skim milk lb. | 581 | 569 | 557 | 552 | 551 |
| Av. profit per head over feed cost $ | 10.49 | 10.89 | 11.06 | 11.21 | 11.20 |
| Live grading of hogs: | | | | | |
| Select bacon | 16 | 15 | 17 | 15 | 16 |
| Thick smooth | 4 | 5 | 3 | 5 | 3 |

## Oats

Oats are one of the staple cereals of Alberta, and may well form a part of the ration for most classes of pigs. They may be used as part of the grain mixture for growing and finishing pigs, and for breeding stock, but we would not recommend that they be fed as a sole grain to any class of pigs. We are led to this conclusion as a result of our experimental work which indicates that grade A bacon hogs can be produced more efficiently and with less trouble from intestinal irritation or enteritis if oats are limited to not over 25% of the ration. The use of the heavier grains, such as barley and wheat, reduces the percentage of hull in the ration, and the young pigs are able to make better use of the feed consumed.

## Wheat

Wheat has not been commonly thought of as a pig feed unless in the form of the frozen or lower grades, but at times, owing to the establishment of quotas or a shortage of coarse grains in some areas, the place of wheat in swine rations comes prominently to the fore.

On the basis of an experiment conducted at the University of Alberta during the winter of 1951-52, No. 5 and feed wheat were equal to or better than barley for growing and finishing swine except that they resulted in lower grading carcasses. In this experiment, 100 lb. of wheat was equal to 107 to 112 lb. of barley. With pigs selling at $23.75 per cwt. grade A carcass, the No. 5 wheat was marketed through pigs at $2.15 per bushel as compared with $1.65 at the elevator.

In an earlier experiment conducted during the summer of 1929, when pigs were allowed to help themselves to ground wheat, oats and barley from separate self-feeders, they showed a decided preference for wheat. The greater the proportion of wheat consumed the smaller was the amount of feed required to produce 100 pounds of gain.

While in some areas it has been considered an extravagance to

feed wheat to pigs, it would appear that lower grades of this cereal could with profit be incorporated in our swine rations.

### Comparative Values of Barley, Oats and Wheat

Some idea of the comparative values of the three common farm grains for growing pigs may be gained from an experiment conducted during the summer of 1933 with pigs starting on experiment with a weight of from 55 to 60 pounds and carrying through until a weight of approximately 200 pounds was reached. These pigs were fed in drylot without pasture. Tankage was added to the ground grains at a rate of 8%, and the pigs had access to the simple mineral mixture outlined on page 38. In addition to groups being fed the individual grains, a fourth group was fed the three grains mixed equal parts by weight. The results of this experiment are shown in Table VII.

TABLE VII

COMPARISON OF BARLEY, OATS AND WHEAT FOR GROWING PIGS

| | LOT I | LOT II | LOT III | LOT IV |
|---|---|---|---|---|
| | Barley + Tankage | Wheat + Tankage | Oats + Tankage | Oats 1 Barley 1 Wheat 1 + Tankage |
| No. of pigs | 7 | 9 | 9 | 8 |
| Av. initial weight ..... lb. | 54.5 | 57.9 | 59.3 | 61.6 |
| Av. final weight ..... lb. | 208.6 | 199.8 | 190.1 | 195.3 |
| Av. daily gain ..... lb. | 1.29 | 1.28 | 1.15 | 1.38 |
| Feed consumed for 100 lb. gain: | | | | |
| Grain ..... lb. | 376 | 354 | 408 | 323 |
| Tankage ..... lb. | 33 | 31 | 36 | 28 |
| Total ..... lb. | 409 | 385 | 444 | 351 |

It will be noted from the above table that the pigs fed barley and wheat grew at about the same rate and more than one-tenth of a pound per day faster than those fed oats. Wheat proved the most efficient grain, followed by barley and then oats on the basis of pounds of feed required to produce 100 pounds live weight of pig. In this experiment the amount of gain produced by 100 lb. of ground oats was produced by 92 lb. of barley, 87 lb. of wheat and 79 lb. of grain when the three were mixed.

### Rye

This grain is grown quite extensively in some parts of Alberta and in these areas is relied upon to a considerable extent as pig feed. Compared with grains already discussed it is an inferior pig feed, lacking in palatability and inefficient in promoting growth when fed alone. In connection with experiments conducted in 1923 and 1924 with finishing pigs, it was found that pigs took very unkindly to the rye when it was fed as a sole grain, and it was only worth 70% as much as barley as a finishing grain. When mixed with other grains it could be used satisfactorily and economically. Rye containing as much as 0.1% ergot should not be fed to any class of pigs.

### Corn

This cereal does not occupy a prominent position in pig feeding in Alberta, but improvement in varieties may extend the corn belt at least to the extent of making the crop available for hogging down purposes. On account of its tendency toward fat production and a slight softening effect on the carcass, corn is not favored as a bacon feed, but when mixed with other grains and balanced with milk or other suitable supplements, it might constitute from one-quarter to one-third of the ration.

### Screenings

Screenings of the quality of "No. 1 Feed" containing mainly small cracked grains, wild oats, buckwheat, and free from mustard and similar seeds, constitute a useful pig feed. In an experiment conducted during the summer of 1926, pigs fed ground screenings of the above quality along with 5% of tankage made an average daily gain of 1.09 pounds and required 394 pounds of feed to make 100 pounds of gain. Again, in an experiment carried out during the winter of 1933-34 pigs fed standard recleaned screenings with 8% of tankage gained 1.28 pounds per day and required 454 lb. of the screenings for 100 lb. live weight gain. The screenings were marketed through the pigs at a substantial profit.

Light, chaffy screenings are high in fiber, and consequently low in feeding value. Legume seed screenings were found to be of low value as pig feed in experiments conducted during 1948-49 at the University of Alberta.

### Weed Seeds

While weed seeds are usually utilized in the form of screenings and are thus fed mixed with small or cracked wheat or other grains, there may be times of emergency when they constitute the only feed supply. Of the various weed seeds, wild oats can be utilized to best advantage, and in an experiment conducted during the winter of 1933-34 it was found that wild oats had as high a feeding value as good feed oats. Wild buckwheat has a fairly high feeding value and pigweed seed when mixed with grains can be made use of in pig feeding. In connection with an experiment conducted at the University of Alberta during the winter of 1937-38, when ground pigweed seed was fed along with ground oats and barley and a supplement added, it was found that pigweed seed had a feeding value of approximately 90% of that of oats. Seeds of the mustards and stinkweed are objectionable and pigs will usually refuse to eat mixtures which contain these seeds in any quantity. Such weed seeds may even cause an objectionable flavor in the meat of pigs. All weed seeds should be well ground before feeding.

### Shorts or Middlings

Shorts or middlings have always been regarded as very desirable pig feeds, particularly for young pigs which find them to be extremely palatable. However, we concluded after a series of experiments that these feeds cannot normally be used with profit unless they can be purchased at a smaller cost per pound than grains are worth on the farm.

### Bran

Bran may with advantage be used up to one-half the ration for brood sows prior to farrowing and immediately after farrowing. It is cooling and laxative, and as a result is valuable as a sow feed. Ordinarily price limits its place in economical pig feeding. Experiments conducted at the University of Alberta during 1949 and 1950 indicated that the dilution of a finishing ration with 20% bran tended to decrease the rate of gain by approximately 0.15 lb. per day, and to increase the feed required per 100 lb. gain by about 40 pounds.

## Roots

While roots may not be regarded as a necessity in pig feeding in Alberta, when they are available they can be used to good advantage. They are of use for brood sows, providing bulk and succulence, but for growing pigs they tend to utilize too much valuable space in the digestive tract. Potatoes may be boiled and mixed with grain and in this way marketed through pigs in years of low potato prices. In an experiment along this line conducted during the winter of 1922, it was found that 411 pounds of cooked potatoes equalled 100 pounds of grain in feeding value.

## Protein Supplements

### Skim milk

This is a supplementary feed for pigs par excellence, and pig raisers who have skim milk available are in a fortunate position. As a feed it is rich in protein required for the production of lean meat, in mineral matter required for the growth of a sound body framework and in vitamins required for correct functioning of the body. It is valuable in compensating for some of the deficiencies of farm grown grains, and when supplementing the cereals makes for very economical production.

We are frequently asked as to the value of skim milk, or what one could afford to pay for it if it could be purchased. Such a figure can best be arrived at by determining the amount of grain which it will replace in pig feeding. This was done in a series of experiments when the influence of skim milk as compared with

other supplements on the quality of the carcass was being studied. Our conclusions were as follows:

| Grain Prices per pound | Value of Skim milk per 100 lb. |
|---|---|
| ½c | 16c |
| 1c | 33c |
| 1½c | 49c |
| 2c | 66c |
| 2½c | 82c |
| 3c | 99c |

The value of skim milk depends upon the rate at which it is fed, and in this connection we recommend the following proportions of grain and skim milk:

| | |
|---|---|
| Weaning to 75 pounds | 2.5 lb. to 1 lb. of grain |
| 75 to 110 pounds | 2 lb. to 1 lb. of grain |
| 110 pounds to market weight | 1 lb. to 1 lb. of grain |

**Buttermilk**

What has been said regarding the place of skim milk in pig feeding holds equally well for buttermilk as it comes from the churn. Buttermilk diluted with wash water or containing a high percentage of any added materials will have a lower feeding value.

**Meat Scrap**

In meat scrap, which is a packing house by-product consisting of thoroughly cooked and sterilized meat and bone scraps, Alberta farmers have a valuable combined protein and mineral supplement. Tankage is a similar product and the general discussion which follows may be applied to it as well as meat scrap. A generally acceptable recommendation is that at least ¼ of the protein supplement added to a ration should be of animal origin such as meat scrap, fish meal or skim milk.

Numerous experiments have been conducted at the University of Alberta to investigate the value of including supplements of animal origin in swine rations. A summary of 2 trials conducted in 1949 and 1950 indicates some response in rate of gain when pigs were fed a protein supplement containing 50% meat scrap in comparison to those fed a protein supplement of mixed vegetable origin, see Table VIII, page 36. However, protein supplements containing soybean oil meal appear to produce just as efficient gains. The economy of meat scrap versus soybean oil meal will depend on the prevailing price of these supplements.

Meat scrap can be used to best advantage when incorporated in mixed supplements. This will result in the most economical and efficient use of the limited volume of the supplement available in Alberta.

**Fish Meal**

In certain countries fish meal is used quite extensively as an addition to the grains in pig feeding as it is recognized as an ex-

tremely good quality protein supplement. A considerable volume of this feed is being manufactured at the Pacific coast, but under usual price conditions its general use as a supplement cannot be recommended. It may be added in limited quantities to improve a supplemental mixture, particulary for young pigs being creep fed or immediately after weaning.

TABLE VIII

A COMPARISON OF MEAT SCRAP AND VEGETABLE PROTEIN SUPPLEMENT

| | LOT I | LOT II |
|---|---|---|
| | Grain 50% Meat Scrap + vegetable proteins No pasture | Grain 50% Soybean Oil Meal + other vegetable proteins No pasture |
| No. of pigs in lot | 14 | 14 |
| Av. no. days fed | 140 | 149 |
| Av. daily gain lb. | 1.21 | 1.16 |
| Feed req'd per 100 lb. gain: | | |
| Grain lb. | 376 | 351 |
| Supplement lb. | 37 | 40 |
| Total lb. | 413 | 391 |
| Cost of 100 lb. gain $ | 10.61 | 10.24 |

### Linseed Oil Meal

While linseed oil meal may be fed to advantage as a portion of a mixed protein supplement it does not have a high value as a sole substitute for skim milk for growing pigs. In connection with experiments conducted during the winters of 1925-26 and 1926-27 it gave the least satisfactory results of a number of supplements tested from both the standpoint of rate of gain and feed requirements.

### Soybean Oil Meal

Of the plant protein supplements available in Alberta, soybean oil meal has considerably the highest supplemental value for pig feeding. Although it is not recommended that it should be used to replace entirely supplements such as meat scrap, experiments at the University of Alberta indicate that it has almost as high a value. See Table VIII.

### Other Supplements of Vegetable Origin

Supplements such as sunflower oil meal and rapeseed oil meal are available on the Alberta market in limited quantities. They may be satisfactorily used to form a portion of the protein supplement in a ration. Limited experimental evidence would indicate that their protein is more valuable than linseed oil meal but less valuable than soybean oil meal. Rapeseed oil meal should be limited to under 3% of the total ration because of the presence of toxic principles.

### Alfalfa Meal

The value of good, green alfalfa meal, particulary when made from fine leafy hay, appears to lie in its being fed in small propor-

tions in a combination supplement or fed by the free choice method on farms where it is produced. In addition to supplying protein and minerals, alfalfa is an excellent source of vitamins A and D and certain B-complex vitamins. Dehydrated alfalfa meal is usually superior to field-cured alfalfa meal or hay except that it supplies very little vitamin D. Dehydrated cereal grasses are similar in value to dehydrated alfalfa meal. As these products are all reasonably high in fiber they should be limited to 5% of the ration for growing pigs.

Alfalfa meal is a very valuable feed for brood sows and may be fed at the rate of 10 to 30% of the grain ration. Leafy green alfalfa hay fed in a rack will prove to be a reasonably good substitute for alfalfa meal and is often much cheaper. Alfalfa hay may be ground at home, thus providing a low cost alfalfa meal of good quality, providing that leafy green hay is used.

## Mineral Supplements

In order that they may grow rapidly, pigs require an adequate supply of mineral matter for skeletal growth. This mineral matter is lacking in our ordinary farm grown grains and, unless the deficiency is made up for by adding certain minerals to the feed, a lack of thrift is likely to develop and such acute conditions as stiffness and rickets may arise. Apart from minerals required for bone growth, the main one being lime, such minerals as iodine, which prevents the birth of "hairless pigs," and iron, which prevents anemia in young pigs, may be lacking. Specific diseases arising from a deficiency of these elements are mentioned under the section dealing with "Swine Diseases" on page 89.

**Fig. 10.**—Pigs which are not receiving sufficient mineral will become crippled. This group of pigs was fed during the winter of 1933-34 at the University on a ration lacking calcium.

A simple mineral mixture which may be used with good results by keeping it before the breeding stock and growing pigs in some such self-feeder as shown on page 86 may be made up as follows:

| | |
|---|---|
| Ground limestone | 40 lb. |
| Bone meal | 20 lb. |
| Iodized salt | 40 lb. |

Unless a commercial protein-mineral supplement is being fed in adequate amounts, it is advisable to mix ½ pound of ground limestone and ½ pound of iodized salt with each 100 pounds of grain mixture.

That pigs respond to the feeding of ground limestone when there is a lack of this mineral in the feed is shown by the results of an experiment conducted during the winter of 1935-36. Two groups of pigs were fed in the piggery during the winter months on a grain mixture of equal parts of ground oats, barley, and wheat with the addition of salt and cod liver oil. One lot had ½ pound of ground limestone added to each 100 pounds of grain.

TABLE IX.—FEEDING GROUND LIMESTONE

| | | LOT I Grain No Mineral | LOT II Grain, ½% Ground Limestone |
|---|---|---|---|
| No. of pigs in lot | | 7 | 7 |
| Av. number of days fed | | 161 | 155 |
| Av. initial wt. | lb. | 46.1 | 44.6 |
| Av. final wt. | lb. | 176.3 | 206.0 |
| Av. daily gain | lb. | 0.81 | 1.04 |
| Feed required for 100 lb. gain: | | | |
| Grain | lb. | 514.1 | 467.1 |
| Mineral | lb. | ..... | 2.4 |
| Cost of 100 lb. gain | $ | 4.23 | 3.88 |

The pigs which did not receive the mineral grew more slowly and required more feed to make their gains than those fed the ground limestone and in addition two pigs in Lot I became badly crippled during the experimental period.

## Vitamin Supplements

Under Alberta conditions, vitamins A and D appear to be the only ones likely to be deficient in swine rations. In summer with pigs on pasture, vitamin A is supplied by the pasture in the form of carotene, and vitamin D is supplied by the sunlight. In a system of management where pigs are confined, supplemental vitamins A and D are required to prevent poor reproduction, crippled pigs and other ailments.

Vitamin D may be supplied by adding products such as irradiated dry yeast or dry vitamin $D_2$ to the ration, while synthetic dry vitamin A products are also available. These products are generally superior to fish oils because of their greater stability. Most commercial supplements contain the essential vitamins in sufficient quantities. If commercial supplements are not used, it is necessary to add the

vitamin supplements to the ration, or to add fish oil to the feed at the time of feeding.

Pigs require 2,600 units of vitamin A per 100 lb. live weight per day, with pregnant sows requiring twice this level, and lactating sows four times this level. Two hundred and fifty units of vitamin D per 100 lb. live weight per day will be adequate. Based on these requirements, one may work out the amount of dry vitamin concentrate to add to a ton of feed. One teaspoonful per pig per day during growth, and one tablespoonful per sow per day of a 1200A-200D fish oil should be adequate. The vitamins in fish oils are quite unstable and are best not mixed in the feed. If mixed, 2 pounds of fish oil per 1,000 lb. of grain should be used.

Trials at the University of Alberta in 1947-48 showed no benefit when riboflavin was added to typical growing rations for pigs, while experiments from 1950 to 1952 demonstrated no positive response through growth, reproduction and lactation when supplemental calcium pantothenate was added to a typical Alberta ration. So far as is known there is little likelihood of a deficiency of any of the other B-complex vitamins.

**Mixed Supplements or "Hog Concentrates"**

Each of the individual protein, mineral and vitamin supplements already mentioned can be used to advantage in pig feeding. However, the best results from the standpoint of rapid gains and economical production are usually secured when several of them are blended together in such proportions as will provide a complete mixture. This process can be carried out on the farm by buying the various ingredients and mixing them according to the standard formula. Difficulty is experienced sometimes in the weighing out of the individual materials and in getting a good "mix" unless a mechanical mixer is available. At the same time the labor involved is considerable.

The alternative is to purchase ready mixed protein-mineral-vitamin supplements which are commonly referred to as "hog concentrates". The mixtures offered to swine raisers by reliable feed companies are made according to standard specifications which have been drawn up on the basis of experimental findings. They provide protein, minerals, and vitamins in satisfactory proportions and amounts and the feeder may feel reasonably certain that, if these supplements are added to the grain in the proper amounts, and well mixed, good results will follow.

The mixing and sale of feeds by commercial concerns is regulated by the Canada Department of Agriculture through the Feeding Stuffs Act. The feeds must meet certain specifications provided for in the Act and on the outside of the bag will be found

information relating to the percentage of important ingredients. The feeder should check this declaration so that he may be familiar with the quality of the feed which he is purchasing.

A combined protein and mineral supplement which has proven reliable may be made up as follows:

| | |
|---|---|
| Meat scrap | 35 lb. |
| Soybean oil meal, linseed oil meal, etc | 40 lb. |
| Alfalfa meal | 15 lb. |
| Ground limestone | 5 lb. |
| Iodized salt | 5 lb. |
| Total | 100 lb. |

The mixture suggested above contains approximately 36% protein. We have found in comparing similar mixtures with tankage, as a supplement to a grain ration, that they will promote slightly higher daily gains and on the basis of extra grain saved are worth 10 to 20% more per 100 pounds than tankage. In other words, if tankage or meat scrap is worth $100 per ton the mixed concentrate is worth $110 to $120 per ton.

The mixture may be modified in a number of ways, although a similar type of supplement should be used to make the substitutions. For example, 10 lb. of fish meal may replace 10 lb. of the meat scrap. As fish meal is very high in protein of excellent quality, the remaining meat scrap may be reduced below 25 lb., with the difference being made up by linseed oil meal.

### Antibiotic Feed Supplements

Since 1949 the University of Alberta has conducted numerous experiments on the use of vitamin $B_{12}$ and antibiotic feed supplements in bacon hog rations. These supplements, containing antibiotics such as aureomycin, terramycin, penicillin and bacitracin, have given large increases in average daily gain and feed efficiency under some conditions, but certain points should be observed in their use to get maximum benefits in production and economy.

Feed the supplements only to 100 lb. in weight as young pigs give the greatest response, and carcass quality is usually lowered if they are fed to finishing hogs. Antibiotic supplements are useful for creep feed rations, rations for unthrifty or "runty" pigs, or pigs that are scouring. Although not thought to be harmful, antibiotic feed supplements are not recommended for use in rations of breeding stock. Experimental results are given later on page 58.

Many commercial protein supplements, pig starters and pig growers now contain antibiotic feed supplements. If you mix your own rations, feed at levels recommended by the manufacturer for the best results and greatest economy. Because of the small amounts of antibiotic supplement required, it is difficult to mix them at home

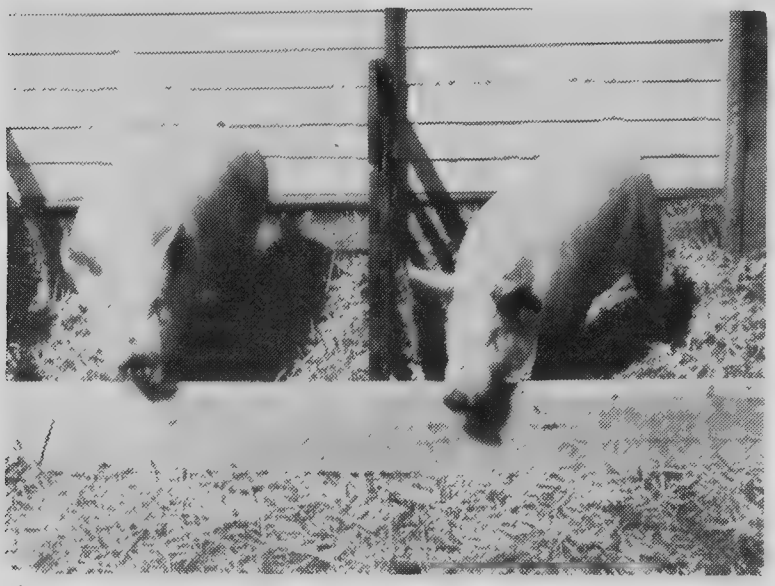


**Fig. 11.**—Antibiotic supplementation of swine rations. Pig on left received an antibiotic supplement throughout the finishing period while pig on right did not. Note evidence of excess backfat in pig on left.

without a feed mixer. Do not use antibiotic supplements to make poor rations good, but rather to make good rations better.

### A Balanced Ration

**In the discussion regarding the feeding of different classes of swine which follows it is assumed that the majority of swine feeders will be using a mixed supplement or "hog concentrate" containing 35 to 40% of protein and recommendations will be based upon this assumption. The term "supplement" will be used in this connection. Generally speaking, 12% supplement should be added to the grain for young pigs and 6% for pigs over 110 lb. in weight.**

A balanced ration is one that supplies all of the nutrients required by an animal at the optimum levels to bring about the best and most economical production. While the addition of one or other of protein or mineral to a mixture of farm grains will bring about improvement in the performance of growing pigs it requires both to balance the ration properly and insure best results. This is indicated by the results of a series of experiments conducted at the University of Alberta during the years 1932 to 1934. Three groups of pigs were included. One group was fed on grain alone, one had ground limestone added to the grain, and a third had both protein and mineral added. The pigs were fed inside the piggery; 1% of

salt and 1% of cod liver oil were added to the feed mixture in all lots. The results are shown in the following table:

TABLE X.—PROTEIN AND MINERAL ADDED TO GRAIN

| | LOT I Grain Alone | LOT II Grain, Mineral | LOT III Grain, Mineral, Protein |
|---|---|---|---|
| Average initial wt. ..... lb. | 50.7 | 50.3 | 50.1 |
| Average final wt. ..... lb. | 139.1 | 166.9 | 200.6 |
| Average daily gain ..... lb. | 0.69 | 0.92 | 1.27 |
| Feed eaten per day ..... lb. | 3.64 | 4.35 | 4.75 |
| Feed required for 100 lb. gain ..... lb. | 525 | 472 | 373 |

It will be noted that the addition of mineral alone contributed to improvement, but more feed was eaten per day, the average daily gain was increased and the feed requirement for 100 pounds gain was lowered when both protein and mineral were fed.

## Pasture Crops

Pasture crops should be utilized extensively in Alberta in connection with pig raising as pasture is a decided asset in the feeding and management of breeding stock. In addition, under the average conditions prevailing, good pasture crops will do at least two things: (1) Provide more sanitary conditions than usually prevail in the pens and yards and thus to a considerable extent avoid the possibility of disease infection and worm infestation. To perform this function a proper system of pasture rotation should be followed to prevent the concentration of diseases and parasites. (2) Allow the pigs the opportunity of securing some of the protein,

**Fig. 12.**—General view of experimental groups of pigs on pasture at the University of Alberta.

minerals and vitamins which may be lacking especially when skim milk is not available.

Experiments conducted at the University of Alberta in recent years indicate than when supplemental feed is not available, one may expect from 30 to 50% more rapid gains and a decrease of from 20 to 30% in the cost of making gains when pasture crops are used as compared with feeding in the drylot. When proper supplements are fed pasture crops do not make such a good showing with growing pigs, but are still valuable. For breeding stock pasture is almost a necessity for optimum success.

Crops which have been tested experimentally as hog pastures are: rape, alfalfa, sweet clover, sunflowers, mixtures of oats and fall rye, and cereal mixtures consisting of various combinations of oats, barley and wheat. Alfalfa has proven a very valuable pasture crop for pigs, making an early start in the spring and providing a bulk of forage throughout the season. Where alfalfa can be grown it is undoubtedly the peer among swine pastures. A mixture of alfalfa and grasses such as brome, will give a longer pasture season, and will often have a longer life. Rape has stood next to alfalfa in our experiments. While it does not provide pasture as early as alfalfa, it has a wonderful carrying capacity under Edmonton conditions and maintains a growth until late in the season. Rape is not a good pasture for young pigs as it causes irritation to their skin. It might be stated, however, that good results have been secured from all of the crops tried experimentally. Annual pastures allow a better system of rotation than permanent pastures, but both have a place. The crops selected will depend upon local conditions, and on this point we conclude that the choice of a crop is really secondary to making provision for green forage in some form.

For the benefit of those who hesitate to use a pasture crop for their pigs on account of the tendency of pasture to cause "blistering" or "sunscalding," we would say that when suitable shelter is provided close to the feed trough or self-feeder, blistering will be reduced to a minimum. When pigs do become so afflicted, a liberal application of mineral oil to the affected parts will generally alleviate the condition.

The following table will show the relative performance of two groups of pigs, one self-fed grain in drylot and the other self-fed the same ration on rape pasture. Tankage was fed at the low level of 5% of the grain ration in both cases, and a small allowance of buttermilk was fed in addition for the first month after the pigs were put on test. Results are based on an average of three experiments conducted during the pasture seasons of 1923, 1924 and 1925.

TABLE XI.—DRYLOT AND PASTURE FEEDING COMPARED

| | | GROUP I Drylot | GROUP II Rape Pasture |
|---|---|---|---|
| No. of pigs | | 22 | 50 |
| Av. initial wt. | lb. | 46.2 | 45.8 |
| Av. final wt. | lb. | 117.3 | 158.8 |
| Av. daily gain | lb. | 0.74 | 1.16 |
| Feed required for 100 lb. gain: | | | |
| Grain | lb. | 511 | 329 |
| Tankage | lb. | 26 | 20 |
| Buttermilk | lb. | 118 | 78 |

In connection with the use of pasture crops for pigs being fed for market, it should be kept in mind that pasture is used as a supplement to grain feeding rather than as a sole means of maintenance as in the case of cattle or sheep. Best results are secured when pasture is used in conjunction with liberal grain feeding. Less protein supplement is required on pasture than in drylot but such supplements should not be dispensed with entirely.

**Fig. 13.**—Brood sows should have access to good pasture during the summer months. The above illustration shows a few of the sows at the University Farm on their summer pasture.

Brood sows can make particularly good use of pasture and every effort should be made to supply them with fresh forage from early summer until fall.

Pasture lots for market pigs should not exceed from one-half acre to one acre in size, and where a larger area is required, cross fencing is strongly recommended. Carrying capacity of pastures varies tremendously with the region, season and type of pasture. However, a general recommendation is that an acre of pasture is sufficient for fifteen to twenty finishing hogs or 3 to 5 sows with litters.

### Feeds for Inside Pig Production

When permanent, sanitary hog houses are available, and when skim milk or suitable substitutes are provided in adequate amounts a system of intensive inside pig feeding can be followed. Pigs may

be pen fed satisfactorily from the time they are weaned until ready for market. This system involves more labor but the investment in pasture land and fencing is eliminated and the difficulty of sunscalding with white pigs is overcome.

Experiments conducted at the University of Alberta since 1934 indicate that pigs full-fed a well balanced ration and pen fed from weaning time until ready for market, make rapid and economical gains and are finished for market without difficulty at around six months of age.

**Inside pig production makes it necessary to study carefully the proper addition of supplements to the farm grown grains. If the protein, mineral and vitamin requirements of pigs are not taken care of under such a system, disappointing results are sure to follow.**

## Preparation of Feeds

### Cooking

Experimental work and private experience have shown that cooking decreases the digestibility of most feeds, and adds to the cost of production. Many feel that winter pigs do better when the feed is cooked, but on the basis of three experiments conducted during the winters of 1920-23, when cooked grain was compared with dry grain fed from the self-feeder, we conclude that the expense of cooking the grain is not warranted. Such feeds as garbage and potatoes are better cooked, but the common grains are more economically fed without cooking. When economy is not an object, such as in fitting for show, the palatability of feeds may be improved by cooking.

### Soaking

Soaking grain does not seem to be good practice, as even when whole grain is soaked conditions are not improved. This occurrence is indicated in an experiment conducted during the winter of 1931-32 at the University of Alberta. Pigs fed whole dry grain (oats and barley)gained at the rate of 0.98 pounds daily and required 455 pounds of grain for 100 pounds of gain, while those fed the same mixture after soaking between feeds gained only 0.76 pounds daily and required 515 pounds of grain to make the 100 pound gain.

### Grinding

We are asked from time to time whether or not it pays to grind grain for pigs. This question is of special interest in times of low prices for grain and hogs. Related to this question is one concerning the degree of fineness to which grain should be ground for pigs. Based on experiments carried out several years ago, it would appear that moderately fine grinding is to be recommended with the ordinary grains if such a treatment can be given to grain at moderate

cost. Wheat should not be too finely ground for pigs; a rather sharp, gritty texture is best.

### Methods of Feeding

There are two methods of pig feeding commonly practised: (1) the hand-feeding method, feeding the grain either wet or dry twice or three times daily, and (2) the self-feeding method, where the self-feeder is used and grain is kept before the pigs at all times.

The method to be recommended will depend upon the number of pigs to be fed, the amount of grain on hand, the rate of gain desired, and the amount of labor available. The relative merits of the two systems have been extensively studied experimentally. The problem was carefully considered in a series of experiments conducted at the University of Alberta during 1946 and 1949-50. Hand-feeding was compared with self-feeding with respect to rate of growth and feed requirements and with regard to influence on the type of pig and quality of carcass produced. In view of the importance of this question the conclusions drawn from these experiments are as follows:

Self-feeding does not cause any large or consistent difference in rate of gain, feed required per 100 lb. gain or cost per 100 lb. gain when compared to full hand-feeding. Under practical conditions pigs are often not full-fed when they are hand-fed and under such conditions self-feeding would undoubtedly increase the rate of gain.

The number of grade A carcasses yielded was similar in both the hand-fed and self-fed groups. More detailed scoring by Advanced Registry methods showed that the carcasses from the hand-fed lot were somewhat superior to those from the self-fed group in the 1946 trial, but this was not so in the 1949-50 trial. Further study suggests that, if the breeding stock in use is just borderline for length and backfat thickness, self-feeding may result in a reduction in the percentage of grade A carcasses.

The experiments indicate that a good deal of labor and often drudgery can be saved by the use of a properly constructed self-feeder, and that, if the breeding stock is of the right type, self-feeding can be practised without serious reduction in carcass quality. Particulars regarding the construction of self-feeders will be found on pages 82 to 86.

## RAISING BREEDING STOCK

Breeding stock can be selected most satisfactorily when pigs are around 200 pounds in weight as at that time it is possible to observe the animals in market condition. Adequate records—see "Identification", page 54—must be kept so that individual litters are

identified, as intelligent selection must be based on performance of closely related stock as well as on the performance of individuals.

## Sows

Having secured the right type of brood sow—see page 17—much of the year's success in pig raising depends on how she is fed and handled prior to breeding and during the pregnancy period. Sows which are bred in good condition and are well nourished during the pregnancy period are much more likely to farrow big strong litters than sows which are thin and run-down when bred and poorly cared for during pregnancy.

## Feeds for Breeding Stock

### Grains

The ordinary farm-grown grains, such as barley, oats and wheat, may form the basis for suitable rations for breeding stock. Mixtures containing about 50% oats have been used satisfactorily at the University of Alberta. Oats are the safest single grain for brood sows, but there is an advantage in adding some wheat or barley to the oats. Barley and wheat alone are too fattening for sows or boars, and may tend to cause weak pigs and a lack of milk in sows at farrowing time.

Grains may be fed ground and either slopped or dry. Self-feeding may be practised but a bulky ration should be used. If sows become too fat on self-feeding, they should be changed to hand-feeding and their feed intake limited.

In order to convey some idea as to the amount of adequately supplemented grain required to bring pregnant gilts and sows through the winter in good condition, the following daily allowances are suggested:

Mature sows: 0.8 to 1 lb. per 100 lb. live weight during the first 12 weeks—1.2 to 1.3 lb. during the last 4 to 6 weeks; to gain 75 to 100 lb. during pregnancy.

Yearling sows: 1.4 to 1.8 lb. per 100 lb. live weight, to gain 100 to 125 lb. during pregnancy.

Gilts: 1.7 to 2.3 lb. per 100 lb. live weight, to gain 100 to 125 lb. during pregnancy.

### Supplements

With mature sows it is not necessary to feed over 5 to 6% of supplementary feed apart from alfalfa meal of good quality or even good, well cured alfalfa hay. Alfalfa meal may be mixed with the grain at the rate of from 10% to 30%, and if the alfalfa cannot be ground and fed in this way it may be placed in feed racks or fed on the ground. If alfalfa is not available some other legume hay may

be substituted or even green oat sheaves will be helpful. With young sows which will farrow their first litter, such foods as skim milk or buttermilk are a great benefit. Our young sows at the University are fed approximately 10% of supplement in addition to alfalfa meal or alfalfa hay. If roots are available they can be fed to advantage to the sows. One pound of bran added to the feed daily for two or three weeks before farrowing will exercise a laxative and cooling influence.

**Fig. 14.**—Yorkshire sow with litter of twelve pigs at the University of Alberta. The pregnant and nursing sow should be liberally fed to stimulate milk production.

Under all Alberta conditions, the feeding of iodized salt or potassium iodide to the pregnant sows is strongly recommended. Particulars regarding this latter treatment will be found under "Swine Diseases" on page 91.

A simple mineral mixture such as the one outlined on page 38 should be kept in front of the sow at this stage, in addition to adding 1% of the mixture to the ration if commercial supplements are not being fed.

**Pasture**

The first prerequisite of good reproduction is that sows have the run of good pasture during the summer months. With good pasture, water and shade, the amount of grain fed should be limited, especially with mature sows, unless they are quite thin when their litter is weaned. Young growing gilts should receive practically as much grain and supplement during the pasture season as at any other time if they are to be given a chance to develop properly. From 1 to 1½ lb. of grain per 100 lb. live weight daily along with good pasture will bring gilts and young sows along in good condition.

### Exercise

Sows should be required to take a reasonable amount of exercise. Therefore, it is a good plan to arrange to have the sows' shelter at some distance from the place where they are fed so that they may be forced to walk a considerable distance for feed. With regard to shelter, the main requirements are a dry bed and freedom from draughts and over-crowding. At the University of Alberta brood sows have been successfully wintered for several years in colony houses of such type as shown on page 79. These colony houses when banked with straw provide good accommodation for from three to four sows, depending upon their age.

### Balanced Rations

**The importance of balanced rations for brood sows is indicated by the results of an experiment which was conducted at the University of Alberta prior to 1949. Sows denied access to pasture and fed continuously on a mixture of 98 pounds equal parts oats and barley plus a pound of ground limestone and a pound of iodized salt weaned and average of only 4.6 pigs per litter as compared to an average of 8.2 for sows fed the same grain supplemented with minerals, feeding oil, protein and pasture in season. Due to the added expense involved in providing pasture as well as protein, mineral and vitamin supplements for the sows of the latter group, the cost of maintaining these sows was somewhat more than one and a half times the cost of maintaining the group that weaned only 4.6 pigs per litter. However, the net return from the well-fed sows over a 3½ year period was four times that realized from an equal number of sows fed the unbalanced ration.**

### Boars

The boar on many farms is apt to be a neglected animal. Since the breeding boar is at least half the herd, this is a very unfortunate state. Actually the ideal treatment of the boar is practically identical with that of sows of a similar age, and suggestions made for feeding the sow should also be applied to the boar. During the breeding season the boar's allowance should be increased and as palatable feeds as possible fed, as many boars are apt to go off feed at that time.

A few special comments on management of the boar are in order. He should be provided with plenty of exercise to keep him in good breeding condition. He should have the company of sows in an adjoining pen to help in keeping him from becoming bad tempered. Young boars should not be used for breeding until they are from 8 to 9 months of age, and not used too extensively during the first season. It is a mistake to allow a young boar to run with the sows

and breed indiscriminately. Mature boars should have their tusks removed to increase safety in their handling.

### Care at Farrowing Time

Farrowing time is the critical time in the pig business. Heavy losses are apt to occur here unless care is exercised. It is estimated that at least 30% of the pigs farrowed are lost each year between farrowing and weaning time. A pig which dies at farrowing may not appear to represent a heavy loss, but it means one pig less at marketing time.

The following farrowing time precautions are suggested:

(1) Provide warm farrowing accommodation for sows farrowing during the winter and early spring months. Artificial heat may be provided in the form of a "brooder house," a heated piggery or electric pig brooder with 250-watt infra-red heat bulbs—see pages 74 and 75. Installation of the latter must be according to the Rural Wiring Regulations of Alberta.

(2) Remove the sow from her winter shelter to a suitable farrowing pen at least one week before she is due to farrow. The length of the pregnancy period in the sow is from 112 to 115 days, or 3 months, 3 weeks, 3 days. It pays to bring the sow into a pen where she can be supervised at farrowing. The sow which comes out of the straw stack with thirteen pigs is loudly proclaimed, but the sow which comes out alone after farrowing does not get any publicity.

(3) Properly clean and disinfect the farrowing pen before the sow is placed in it. It is recommended that the floors be scrubbed with a strong solution of lye in **boiling** water (1 lb. of lye to 30 gallons of water). This destroys worm eggs and prevents the little pigs becoming infested with round worms while in the farrowing pen.

(4) Provide a guard rail around the side of the farrowing pen. This rail, which may constitute a $2'' \times 4''$, or a small pole, should be placed approximately 8 inches from the floor and projecting out 6 inches from the wall. This guard rail allows the small pigs to seek protection when the sow lies down, and is a wonderful means of avoiding loss by crushing—see page 73.

(5) Avoid long coarse straw in the farrowing pen. The newly-born pigs may become either tangled or buried in the long straw, and thus are more likely to the crushed. Cut straw or shavings makes the most suitable bedding for the farrowing pen.

(6) In connection with winter and early spring farrowing especially, the sow should be watched carefully at farrowing time so that help can be given in case of weak pigs or an irritable sow. If the small pigs have become chilled they may be revived by placing

them in a box near the stove, or individual pigs may be wrapped in a warm blanket or immersed up to the neck in warm water. When the sow is irritable or clumsy, it is a good plan to remove each pig as it is born and return the complete litter for nursing when farrowing has been completed and the sow is resting quietly.

**Fig. 15.**—Removal of the small tusks or "black teeth" shortly after a pig is born.

(7) Remove the small tusks, or "black teeth" as they are commonly called, from the mouths of the small pigs within a few hours after they are born. These sharp teeth irritate the sow's udder and cause cuts and scratches on the faces of the pigs while fighting at nursing time. The job can be done with sharp small nippers made for the purpose. Care should be taken to avoid cutting the gum, and to avoid jagged edges on the cut tooth. See figure 15.

(8) Failure of the sow to milk is discussed on pages 52 and 93.

### Feed and Care of Sow and Litter

Beginners are often anxious to feed the sow heavily immediately after farrowing. Sows should not be fed heavily following farrowing but should be allowed lukewarm water. If they are not sick they should be allowed feed as soon as they wish to eat, which is usually inside of 12 hours. The first feeds given should contain a high percentage of such feeds as bran, shorts and oats. The feed may be gradually increased and heavier feeds added until the sow is on full feed in about a week.

The most satisfactory ration at this time is one that includes

either skim milk or buttermilk. These feeds naturally tend to stimulate the milk flow and preserve the body weight of the sow.

After the first few days oats, barley and wheat may be used satisfactorily for the nursing sow. We have found the following mixtures satisfactory:

| | | | | |
|---|---|---|---|---|
| **Oats 1 part** | | **Oats 1 part** | | **Oats 2 parts** |
| | **or** | | **or** | **Barley 1 part** |
| **Barley 1 part** | | **Wheat 1 part** | | **Wheat 1 part** |

When skim milk or buttermilk is not available, the addition of 12 lb. of protein-mineral-vitamin supplement( sow concentrate) to each 100 lb. of grain is to be recommended.

Failure of the sow to milk is frequently brought about by faulty management and inadequate feeding during pregnancy. Feed well balanced rations containing plentiful protein, mineral and vitamin as discussed earlier. Do not wait until the last few weeks of pregnancy to feed such a ration, but feed it throughout the entire pregnancy period. A light, laxative feed will sometimes bring about milk flow in a sow which fails to start milking. A run-down condition due to overwork from previous litters may cause a sow to dry up, and in this case very little can be done to re-initiate milk flow. She must have reserve flesh to draw upon during lactation. Even with adequate rations and good management an occasional sow may not milk, and in such a case milk flow can sometimes be initiated by the use of hormones as discussed on page 93.

## Care of the Litter Before Weaning

### Prevention of Anemia

When pigs are born during the winter and early spring months and are confined to the piggery, special care must be taken to prevent the development of anemia. This condition may cause serious direct and indirect losses and should be guarded against. For treatment refer to "Swine Diseases," page 92.

### Creep Feeding

The small pigs will begin to eat solid feed by the time they are three weeks of age. This should be encouraged as the sow has passed her maximum milk production at this stage and cannot supply pigs with all the nutrients they need. The young pigs should be provided with a separate trough or small self-feeder, as a hungry sow may throw the small pigs against the edge of the trough or the wall and injure or even kill them. In addition, the sow's feed is usually not satisfactory for young pigs and they should have their own "creep" ration. If the pen is large enough, it is a splendid scheme to partition off a corner leaving an opening where the small pigs may go in for feed but where the sow cannot enter. Grain may be placed

in a small trough or self-feeder in such a creep and the small pigs may help themselves as they please. The creep feed self-feeder illustrated on page 75 has been found very useful in preparing pigs for the weaning period.

**Fig. 16.**—A thrifty litter at the University Farm. Creep feeding is necessary as a supplement to the sow's milk to wean heavy litters.

A suitable mixture for feeding in creeps may be made up as outlined below. A similar creep feed was used in the fall of 1952 at the University Farm and pigs were weaned at an average weight of 35.9 pounds compared to approximately 28.4 pounds over the past 17 years and 26.5 pounds during the past 2 years.

| | | |
|---|---|---|
| Oat groats (hulless oats) | 40 | lb. |
| Barley (finely ground) | 20 | " |
| Wheat (coarsely ground) | 20 | " |
| Meat scrap | 5 | " |
| Fish meal or skim milk powder | 3 | " |
| Soybean oil meal | 4 | " |
| Dehydrated alfalfa meal | 4 | " |
| Brewers' yeast | 2 | " |
| Ground limestone | 0.5 | " |
| Iodized salt | 0.5 | " |
| Antibiotic supplement approx. | 0.5 | " |
| Fish oil* | 0.5 | " |
| | 100.0 | lb. |

*Use of synthetic dry vitamin A and a source of dry vitamin D such as irradiated yeast is preferable to fish oil.

About 50% of the oat groats may be left unground. This appears to increase palatability and gets the pigs started to eat at an early age. Care must be taken not to use whole oats as small pigs cannot

digest the coarse hulls and, in addition, the sharp hulls may cause digestive troubles. If all of the ingredients are finely ground, the use of pelleted creep feeds appears to encourage early consumption of the feed by the suckling pigs. If skim milk is available it should replace water for the young pigs, in which case the meat scrap and fish meal or skim milk powder may be reduced in the creep feed.

There are commercial fortified pig starting rations available which may be used to good advantage at this stage, particularly if skim milk is not available. The use of such "starters" cuts down on the amount of labor involved in mixing feeds and avoids the necessity of purchasing and weighing out of small quantities of a number of supplements as shown on page 53.

Artificial sows' milk to replace sows' milk from the time the pigs are a few days of age is becoming available. Further information is required on the economic and management problems under Alberta conditions before these milk replacers can gain any wide acceptance. If used, adequate directions for feeding are supplied by the manufacturers.

**Castration**

Male pigs from all grade sows and purebred male pigs which are not good enough to be kept for breeding purposes should be castrated at six weeks of age. Many farmers hesitate to castrate pigs, but the operation can be safely done if a few simple precautions are observed. Cleanliness, a sharp knife, a fairly generous incision coming well down on the scrotum to permit drainage, and a disinfectant in the wound are the main precautions.

**Registration and Indentification**

Purebred pigs must be identified by tattoo marking or ear tag before the pigs are eight weeks of age. If tags are used they should be inserted between the large veins and well down toward the base of the ear so that permanent drooping of the ear may be avoided. Registration of swine in Canada is carried out through the Canadian National Livestock Records. **New purebred breeders are advised to write to Canadian National Livestock Records, Department of Agriculture, Ottawa, for full instructions regarding rules for the identification and registration of purebred pigs.** "Canadian Swine" is the official quarterly of the Canadian Swine Breeders' Association.

The tattoo and tag methods of identification are official. Another method which may be adopted for private use is the ear notching system in connection with which a "V"-shaped notch is cut out of the edge of the ear with an ear notcher. A convenient marking system for up to several hundred pigs is shown in Fig. 17. Use of

such a system will greatly improve selection of gilts as litters and pigs are identified.

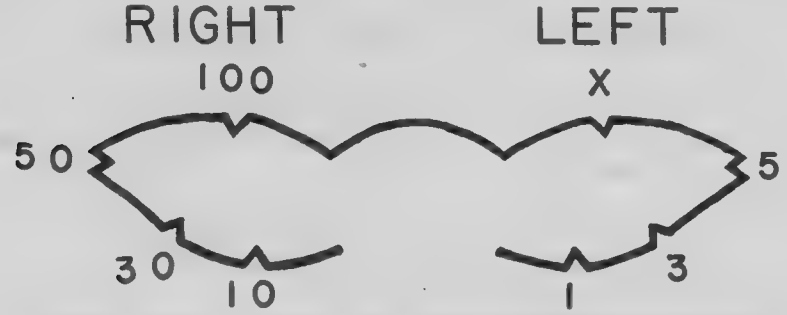



**Fig. 17.**—System of notching pig's ears for identification purposes.

It will be noted that various combinations may be worked out. The right ear may be used to identify litters with all one litter being marked in the 20's all the next in the 30's, etc. The left ear may be used to identify individuals within each litter. The first 10 pigs are notched 0 to 9, with the eleventh pig receiving an X, the twelfth 1X, etc. Examples are shown in Fig. 18.

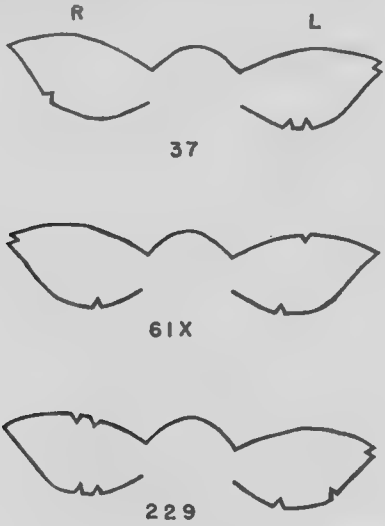



**Fig. 18.**—Examples of the use of the ear notching system.

In additional explanation, it may be noted that two notches at the bottom of the left ear where the 1 is placed equal 2, or two similar notches on the right ear equal 20. A notch at 1 and 3 on the left ear equals 4, or a notch at 1, 3 and 5 equals 9. Similar notches on the right ear would equal 40 and 90 respectively. If a person

just wishes to identify litters but not individual pigs, only one ear needs to be used with litters identified as 1, 2, 3, etc.

## FEEDING AND MANAGEMENT AFTER WEANING

If two litters per year are to be raised, pigs should be weaned at eight weeks of age. Some wean pigs at six weeks regardless of condition, but pigs weaned at this age are handicapped as compared with those weaned later.

The weanling stage is the critical period in the pig's life, and a special effort must be made to carry the young pig over from the mother's milk period of his existence to a point where his digestive organs become accustomed to large amounts of solid food. It must be remembered that whole milk is rich in protein and minerals and contains certain vitamins that are essential for growth and health. **If a sudden change is made to a feed mixture which is very coarse in texture or is seriously lacking in the essentials mentioned, digestive disturbances are apt to develop, resistance to infection will be lowered and serious losses may follow.**

If the pigs have been well acquainted with the feed trough and a good combination of feeds before weaning (preferably by the use of a "creep"), the chances of a weaning set-back developing will be avoided to a large extent.

### Grains

Farm-grown grains have been found satisfactory for weanling pigs, and where good quality barley, oats and wheat are on hand a suitable feed mixture can be worked out when proper supplemental feeds are provided. A mixture of grains will give better results than feeding one alone. Since the small pigs cannot handle much bulk, oats should be restricted to 25% of the ration. If hulless or sifted oats are available these may be fed at higher levels. In this connection the results, shown in Table XII, of an experiment conducted at the University Farm in the spring of 1948 are of interest.

TABLE XII.—OATS vs. BARLEY FOR PIGS AFTER WEANING

| | GROUP 1 | GROUP 2 |
|---|---|---|
| | Oats ..... 70<br>Barley ..... 15<br>Supplement ... 15 | Oats ..... 15<br>Barley ..... 70<br>Supplement ..... 15 |
| Number of pigs | 7 | 7 |
| Number of days on experiment | 51 | 51 |
| Av. initial weight ..... lb. | 25.7 | 25.6 |
| Av. final weight ..... lb. | 59.0 | 64.3 |
| Av. daily gain ..... lb. | 0.65 | 0.76 |
| Feed required for 100 lb. gain ..... lb. | 319 | 306 |

The fiber content of the 'oat' ration fed to Group 1 was 9% as compared to 6.5% for the 'barley' ration of Group 2. As shown in the above table, weanling pigs fed a ration containing 70% barley

grew faster and made more economical use of their feed than those fed a ration containing 70% oats. The proportion of oats, barley and wheat may be altered slightly one way or other without danger. Oats and barley should be ground fairly finely for weanling pigs but wheat should be left in rather a sharp gritty state.

### Protein Supplements

The best substitute for the mother's milk is skim milk or fresh buttermilk, but as these are often not available some substitute should be provided. A properly blended protein-mineral-vitamin mixture will serve as a good substitute for milk at this stage..

The supplement may be mixed with the grain at a rate of 12 pounds in 100 pounds of feed mixture and kept at this level until the pigs reach a weight of around 110 pounds when it should be reduced to 6%. Alfalfa meal at a level of 5% of the ration is an excellent addition to help supply protein, mineral and vitamins.

To indicate the advantage of using some form of substitute when milk is not available , Table XIII is presented. Three groups of pigs as indicated in Table XIII were included in an experiment during the winter of 1939-40 and checked through the after-weaning stage, one group getting grain alone, one tankage as a milk substitute and one skim milk. A mixed protein supplement would probably have given results comparable to those obtained with skim milk—see Table VIII, page 36.

TABLE XIII.—SUPPLEMENTS FOR PIGS AFTER WEANING

| | GROUP 1 Grain Alone | GROUP 2 Grain Tankage | GROUP 3 Grain Skim milk |
|---|---|---|---|
| Number of pigs | 8 | 8 | 8 |
| Average daily gain during 6 weeks after weaning ..... lb. | 0.34 | 0.67 | 1.01 |

### Mineral Supplements

If weanling pigs are receiving plenty of skim milk, or if supplements are being fed along the lines suggested, it will not be necessary to feed mineral mixtures. Such feeds contain both protein and mineral and the feeding of large amounts of additional mineral will not only prove of no value but may actually prove harmful. There is, of course, no harm in self-feeding some simple mineral mixture—see page 38—at the weanling stage.

### Vitamin Supplements

If the pigs are weaned during the late fall, winter or early spring months, and especially if confined to the piggery, it is advisable to feed them some source of vitamins A and D up to at least 100 pounds in weight. This will assist in preventing symptoms of vitamin D deficiency (crippling) and vitamin A deficiency ( poor growth,

staggering and dizziness) and may help in improving resistance to infection—see page 90. Animals to be saved for breeding stock should receive a vitamin A and D supplement continuously.

### Antibiotic Supplements

Vitamin $B_{12}$-antibiotic feed supplements or antibiotic supplements are usually very useful in promoting increased rate of gain in weanling pigs up to 110 lb. in weight. They should not be fed past that stage because they are detrimental to the quality of the bacon carcass and are less economical than during the growing period. The results of a typical experiment conducted at the University of Alberta in the summer of 1950 to study the addition of an antibiotic supplement to 2 growing rations are given below:

TABLE XIV.—ANTIBIOTIC SUPPLEMENTATION OF GROWING RATIONS

| | GROUP 1 Mixed animal-vegetable protein | GROUP 2 As 1 plus antibiotic | GROUP 3 Vegetable protein | GROUP 4 As 3 plus antibiotic |
|---|---|---|---|---|
| No. of pigs | 7 | 7 | 7 | 7 |
| No. of days fed | 84 | 70 | 96 | 70 |
| Av. initial weight lb. | 30.9 | 30.6 | 31.0 | 30.9 |
| Av. final weight lb. | 123.3 | 123.1 | 128.7 | 122.9 |
| Av. daily gain lb. | 1.10 | 1.32 | 1.02 | 1.31 |
| Av. daily feed lb. | 4.16 | 4.59 | 3.50 | 4.04 |
| Feed required for 100 lb. gain lb. | 378 | 347 | 344 | 307 |

With unthrifty or "runty" weanling pigs phenomenal increases in rate and efficiency of gain are often obtained by the use of antibiotics. Experiments at the University of Alberta have resulted in increased rate of gain of as much as 85% by adding antibiotics to pig starter rations for unthrifty pigs. The use of antibiotic feed supplements in "creep" rations may, in turn, prevent many of these runts developing, and help to lower the incidence of scouring. Details of the proper use of antibiotic supplements are given on page 40.

### Method of Feeding

In our experience young pigs of the proper bacon type may be hand-fed or self-fed right from weaning time. The system which will be followed may depend upon the factors which were discussed on page 46. A system of self-feeding is being followed very satisfactorily under our system of management at the University and we are inclined to recommend this method when any large number of pigs is to be raised.

**In mixing feed for young pigs, care should be taken to add supplements in the proportions recommended on the basis of experimental work. It is a good plan to check a few mixes by actual weighing of the feeds and then follow these proportions consistently. The addition of supplements greatly in excess of recommendations, sudden changes in mixtures or improper mixing may lead to digestive troubles.**

Pasture crops and their place in pig raising were discussed on page 42, but we should emphasize their value for all classes of pigs.

**Water**

If possible, water should be kept in front of the pigs at all times during the summer. The automatic waterer shown on page 85 makes provision for a steady water supply. A concrete platform is advisable to prevent formation of a mud wallow.

**Worm Treatment**

Shorty after weaning if there is a suspicion that the pigs are suffering from worm infestion, they should be treated with sodium fluoride as recommended under "Swine Diseases" on page 99.

**Shade**

If natural shelter is not available in the form of brush, colony houses work in well for summer shade. Shelter should be convenient to where the pigs feed, or they may spend too much time in the sun and suffer from sunburn or sunscald. This is a serious problem, especially with white pigs, and causes a good deal of worry and loss on many farms. Blistered pigs should be well treated with oil of some kind; mineral oil will be found suitable.

## Finishing Feeder Pigs

As a general rule it pays to allow pigs all the grain they will eat during the pasture season. The plan of "growing pigs" on a limited feed of grain and "finishing" them with more liberal grain feeding, may result in a slight saving of grain, but this saving is usually offset by the extra labor cost involved in a longer feeding period, and our experiments of recent years indicate that the quality of the carcass is apt to be lowered by the practice of carrying pigs along

**Fig. 19.**—Spring farrowed pigs make good use of pasture as a supplement to grain during the summer months.

during a "growing stage" on a limited grain ration. All things considered, it is a wise plan to finish the pigs as they grow, or in other words, to feed liberally from the time the pigs are weaned until they are ready for market.

Some modification in a feeding plan may be necessary, of course, depending on the type of pigs being fed. It is important that the finishing process be regulated so that the pigs are properly finished at weights of from 200 to 210 pounds at the farm. Pigs which are under-finished at these weights are very objectionable as they yield flabby, undesirable carcasses which are apt to be placed in the lower grades. After pigs have reached a weight of from 140 to 150 pounds they should be confined to smaller pens, thus eliminating the exercise which results from feeding in large pasture lots.

**Rations**

Oats, barley, wheat and rye may all be used in working out suitable feed combinations for finishing pigs. Barley is the best finishing feed, and when available it should form a large part of the finishing ration. Wheat has given good results in our finishing tests and can be used with barley or as a substitute for it. In an experiment conducted at the University of Alberta during the winter of 1951-52 rations containing No. 5 or feed wheat resulted in lower-grading carcasses than were obtained on a barley ration. Rye is not relished by pigs, but can be utilized when mixed with other grains. In one of our 1923 experiments a mixture of equal parts of oats, barley and rye gave very good results. Oats are a relatively inefficient finishing feed if they form over 25% of the ration.

When pigs are finished in drylot, a supplement may be fed at the rate of 6% to good advantage. Grain mixtures suggested for finishing pigs are as follows:

| | | | | |
|---|---|---|---|---|
| Oats 1 part<br>Barley 3 parts | or | Oats 2 parts<br>Wheat 3 parts | or | Oats 1 part<br>Wheat 1 part<br>Barley 2 parts |

**Feed to Proper Market Weight**

In order to indicate the rate of gain which may be expected during the finishing period and at the same time to suggest the advantage in economy and avoiding overfinish which results from marketing pigs at around the 200 pound mark as compared with carrying them to heavier weights, the following table showing the results of an experiment conducted during the fall of 1939 is presented.

It will be seen that while both groups of pigs made very good gains, the pigs which were fed out until they averaged 225 pounds in weight required a larger amount of feed to put on each extra pound of weight. Gains became more expensive after the 200

pound mark was reached. In addition, the pigs marketed at the heavier weight yielded carcasses showing thicker fat at shoulder and loin. They would be degraded for overweight on our present grading system. It does not pay to carry pigs past a maximum of 210 pounds live weight.

TABLE XV.—THE INFLUENCE OF MARKET WEIGHT ON FEED REQUIREMENTS

| | | LOT I Marketed at 200 lb. | LOT II Marketed at 225 lb. |
|---|---|---|---|
| Average initial wt. | lb. | 139.0 | 136.3 |
| Average final wt. | lb. | 200.0 | 225.7 |
| Average daily gain | lb. | 1.80 | 1.74 |
| Feed required for 100 lb. gain: | | | |
| Grain | lb. | 311 | 350 |
| Skim milk | lb. | 311 | 350 |
| Cost of 100 lb. gain | $ | 2.86 | 3.22 |
| Av. depth of fat at shoulder | in. | 1.73 | 2.00 |
| Av. depth of fat at loin | in. | 1.28 | 1.63 |

## FARM GROWN GRAINS

In order to bring together some of the suggestions already presented on grain feeding, the following plan is offered:

TABLE XVI.—PROPORTION OF FARM GRAINS FOR PIGS OF VARIOUS WEIGHTS

| Weight of Pig | Lb. of barley or wheat in 100 lb. | Lb. of oats in 100 lb. | Lb. of supplement in 100 lb. | Total |
|---|---|---|---|---|
| Weaning to 75 lb. | 63 | 25* | 12 | 100 lb. |
| 75 to 110 lb. | 65 | 25 | 10 | 100 lb. |
| 110 lb. to 200 lb. | 69 | 25 | 6 | 100 lb. |

*Oat groats may be used at much higher levels in this period.

## THE PRODUCTION OF WINTER PIGS

As was pointed out previously, one of the major pig marketing problems in Western Canada develops out of the uneven distribution of marketings throughout the year. As a general rule more pigs are marketed during the fall and early winter months than during the spring and early summer months, a condition which disturbs the processing end of the business, as well as marketing connections for the finished product.

The raising of two litters per year by at least a fair percentage of the sows, would tend to equalize the marketings and in addition would lower the cost of production. The cost of carrying a sow for the year is very little greater when she farrows twice than when she farrows only once.

It must be borne in mind, of course, that when sows farrow during the late fall or winter months, better than average farrowing quarters must be available. Provision will have to be made for artificial heating—see page 74—, care must be taken to avoid chilling of the young pigs at time of birth and during the suckling period, and strict precautions will have to be taken to guard against the development of anemia in the young pigs—see page 92.

Pigs farrowed during the late fall or early winter months may cost more to produce but on the basis of the usual price prevailing on an open market they will bring a higher price than those farrowed in the spring and marketed during the fall months. In the University of Alberta herd for the 15 years from 1935 to 1949, it took an average of only 3 days more per pig to market fall pigs compared to spring pigs. Eight pigs per litter were weaned from the fall litters compared to only 7.6 pigs per litter from the spring litters.

### Shelter for Winter Pigs

The main prerequisite for successful winter pig production is the provision of warm, dry, draft-free quarters.

While pigs farrowed during the fall and winter months require adequate housing during the nursing period, they do not require elaborate shelters during the growing and finishing stages. At the University of Alberta colony houses have proven very satisfactory for winter pigs, with the gable-type house shown in Fig. 20 being used extensively as a shelter. Shed-type colony houses are somewhat cheaper to construct and equally useful.

**Fig. 20.**—Colony houses banked to the eaves with straw provide good shelter for wintering pregnant sows. A heavy sack should be hung over the doorway in the winter months.

The 6′×8′ colony house—see page 79 for construction details—will accommodate from 8 to 10 pigs comfortably. In locating the colony houses for the winter they should face south and be crated and banked to the eaves with straw. A heavy burlap sack hung over the door breaks the wind and provides suitable protection for the doorway.

If a well built permanent piggery is available this may be used not only for fall and winter farrowing, but for housing the pigs during the growing and finishing stages. Such buildings should be insulated and well ventilated to prevent the accumulation of frost on the walls and ceilings during the extremely cold spells. A small stove in such a building is a necessity in preventing frost accumulation and dampness—see page 78.

During the winter of 1936-37 an experiment was conducted to compare the feeding of fall pigs sheltered in colony houses as shown in Fig. 20, with others sheltered in the permanent piggery with artificial heat provided. The two groups of pigs were similar in breeding and were fed the same ration with the exception that the pigs which were confined in the piggery were fed cod liver oil at the rate of 1 pound to each 100 pounds of grain and supplement until they weighed 100 pounds.

The results of the experiment are shown in the following table:

TABLE XVII.—METHOD OF HOUSING FALL PIGS

| | LOT I | LOT II |
|---|---|---|
| | Piggery, Heated with Stove | Colony House |
| No. of pigs in lot | 5 | 5 |
| No. of days on experiment | 112 | 128 |
| Av. initial weight lb. | 43.7 | 41.9 |
| Av. final weight lb. | 212.0 | 207.0 |
| Av. daily gain lb. | 1.50 | 1.29 |
| Feed required for 100 lb. gain: | | |
| Grain lb. | 327 | 353 |
| Suppplement lb. | 43 | 48 |
| Total lb. | 370 | 401 |
| Cost of 100 lb. gain $ | 5.93 | 6.42 |
| Profit per pig over feed cost ($8.00 per cwt.) $ | 4.45 | 3.45 |

It is to be noted that the pigs fed in the piggery where some heat was provided made their gains more quickly and with less feed. At the same time, the pigs fed in the colony houses made very satisfactory and economical gains. It would seem that while the permanent piggery has some definite advantage over the colony house as a shelter for fall pigs, the colony house, with outdoor quarters, will render good service.

### Suitable Rations for Winter Pigs

In planning feed mixtures for winter pigs it is well to keep the following general principles in mind: (1) The pig fed during the winter months cannot make use of pasture or green feed in the same sense as the pig farrowed during the spring or summer months and, therefore, cannot help to balance his own rations; (2) Gains should be such that most of the pigs may be marketed at between six and seven months of age.

Unless the ration of the winter pigs is well balanced, gains are likely to be slow and comparatively expensive. Pigs badly fed

during the winter months can "pile up a heavy feed bill" and prove a liability rather than an asset.

With regard to grain mixtures for winter pigs, what has been said already concerning the use of farm grown grains and the most suitable proportioning of these grains will apply equally well here.

When skim milk or buttermilk is to be had, success in winter pig raising is almost assured. When such feeds are not available, we are quite sure from our experimental findings that some substitute must be provided if satisfactory results are to be secured. The spring pig handled on the outdoor plan may get pasture but the winter pig is deprived of this source of additional protein. Here, again, supplements in the proportions mentioned on page 61 will prove of great value when added to the grains. They will insure quick gains and each pound of the supplement will save sufficient grain to more than justify the purchase price.

**Fig. 21.**—Littermate fall pigs at six months of age. The pig on the left weighed 230 lb. and the pig on the right weighed 80 pounds. Providing sufficient mineral in the feed made the difference.

The winter raised pig is for the most part grown under conditions which deprive him of the use of forage and contact with the soil. For this reason the question of a mineral supply is of even greater importance in the case of the fall and winter farrowed pig than with the spring pig. Mineral supplements—see page 38—work hand in hand with protein supplements in rounding out complete rations for winter fed pigs.

Pigs which are farrowed during the fall and winter months, if closely penned following weaning, will be benefited by the feeding of some form of vitamin A and D supplement until they reach a weight of at least 100 pounds—see page 38.

When skim milk or buttermilk is not abundant, and when the grain is fed dry from self-feeders, winter pigs will use a considerable

volume of water. If possible it should be supplied three times daily and the trough kept as free as possible from freezing. It is doubtful if the expense of warming the water is justified. In an experiment conducted at the University of Alberta during the winter of 1923-24, the warming of the water did not effect any improvement. Under certain conditions, however, it would appear to be advisable to remove the chill from the water for very young pigs, particularly when the weather is extremely cold.

### Winter Pigs Pay Their Way

During the period from 1922 to 1952 approximately 5,300 pigs have been farrowed during the fall months, and grown and finished during the winter months, at the University of Alberta. The majority of these pigs have been used in experiments regarding the feeding and management of pigs finished during the winter months, and in addition the economics of the business has been carefully checked. Over this period, pigs grown out during the winter and marketed during the spring months have returned a satisfactory profit over and above feed costs, after labor and investment in the pigs and equipment were charged against the operation. The margin between cost of production and selling price has varied year by year depending upon the relationship between hog and grain prices, but over a period of years the second litter has proven profitable.

**It has been demonstrated clearly in our winter experiments, however, that the feeding of protein, mineral and vitamin supplements is a necessity if economical gains are to be made. The large number of inquiries which we receive each year during the late winter months, regarding slow gains and "crippling" among winter pigs, indicate that more attention must be paid to better balanced rations.**

APPENDIX A

# Equipment For Swine Raising

BY

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Sessional Lecturer in Agricultural Engineering.

## BUILDINGS

The type of housing required for swine depends largely upon the management program. Where pigs are farrowed only in the spring, very little in the way of housing is required. Colony houses which provide shelter from the weather are often adequate.

Most authorities agree that two litters should be farrowed per year for best returns from a swine enterprise. If this practice is followed, suitable winter quarters must be provided for the pigs.

### Centralized Hog Houses

On the average farm, year around housing can most economically be provided by a centralized house which provides for both farrowing and feeder pens. The basic requirements for a satisfactory building of this type are: a suitable pen and feed storage arrangement for efficient management; adequate warmth; and sufficient ventilation.

### Feeder Pen Arrangement

Except in very small hog houses, there are usually two rows of pens, one row on each side of a central alley. Each pen should provide space for feeding and watering, a raised sleeping platform, and a litter alley.

The location of the litter alley is the basic difference in the two most common types of piggeries. One plan makes use of the space between the troughs and the sleeping platforms as a litter alley, Figure 22 shows a floor plan of this arrangement, while Fig. 24 shows a cross section through a feeder pen. Farmers who are using piggeries with inside litter alleys seem well pleased. With this arrangement, swinging gates are provided in the litter alley between each pen, and the piggery is cleaned by simply running a scraper down the litter alley.

Figure 25 shows the floor plan of a Danish type piggery. The distinguishing feature of the Danish plan is the outside litter alley.

Piggeries designed along these lines have proven reasonably satisfactory. A criticism has been that the building is wider and therefore more expensive than necessary due to the addition of the litter alleys. A second criticism has been that freezing is a problem in the litter alleys during severe weather due to their placement against the outside walls.

A satisfactory size for feeder pens is about 100 square feet. Each market weight hog requires about 15 square feet of space, so a pen of 100 square feet will carry the average sized litter until they are ready for market. Construction details are shown in Fig. 26.

Feeder pen floors are usually made of concrete. There is some complaint that concrete is too cold, but the difficulty of keeping plank floors clean makes the use of such floors questionable.

**Farrowing Pens and Equipment**

The number of farrowing pens in a piggery is determined by the breeding program. Enough farrowing pens should be provided so that a sow and litter can remain in the pen for at least two weeks.

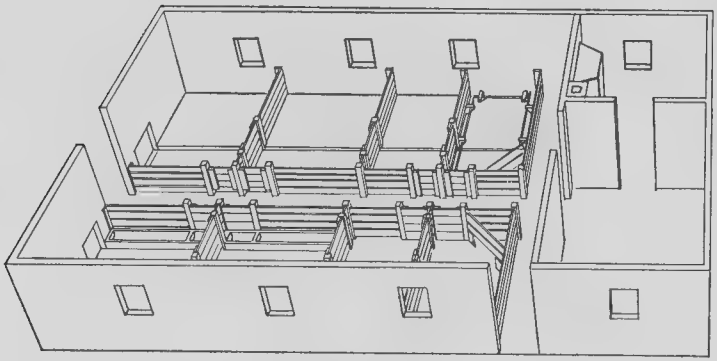
The farrowing pens shown in Fig. 22 are constructed similar to the feeder pens, so that in off seasons they can be used for feeder pigs.

Farrowing pens should be provided with guard rails as shown in Fig. 27. These guard rails prevent the sows from crowding the little pigs against the walls and lying on them.

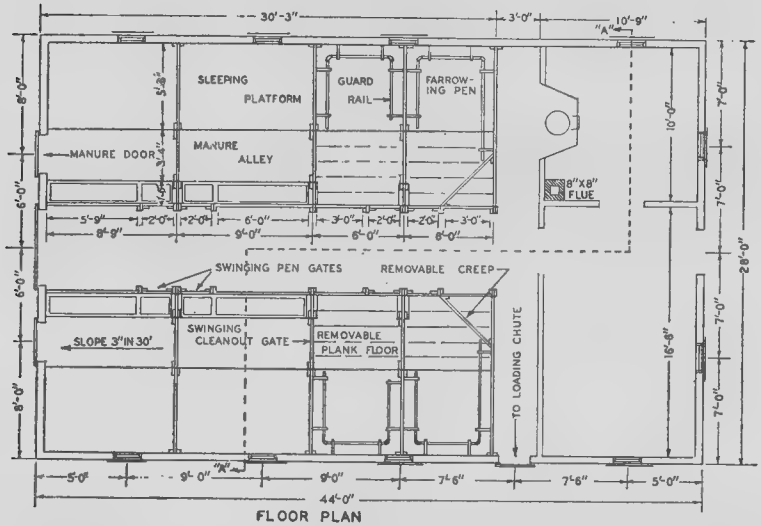
Farrowing pens should also be provided with a wooden sleeping platform for the little pigs, and a creep for extra warmth. One corner of the pen may simply be partitioned off as shown in Fig. 22 or a separate enclosure may be constructed as shown in Fig. 28. These creeps in addition to providing warmth are useful for creep feeding—see page 52, and Fig. 30.

The farrowing pens should be located as close as possible to the source of heat in a piggery. Where power-line electricity is available, a 250-watt infra-red lamp should be suspended over the creep as such lamps are very satisfactory in providing warmth for the little pigs—see Figs. 28 and 29. **Installation of infra-red heat lamps should comply with the Rural Wiring Regulations of the Province of Alberta.**

It should be mentioned that little pigs will not be attracted to the heated creep until they know it is warm, so at farrowing time it is necessary to place each little pig in the creep. After once being placed in the creep, they will return to it.



PICTORIAL VIEW




FLOOR PLAN

**Fig. 22.**—Floor plan and pictorial view of a "General Purpose Hog Barn" with inside litter alley. Detailed plans are available from the University of Alberta or the Provincial Department of Agriculture.

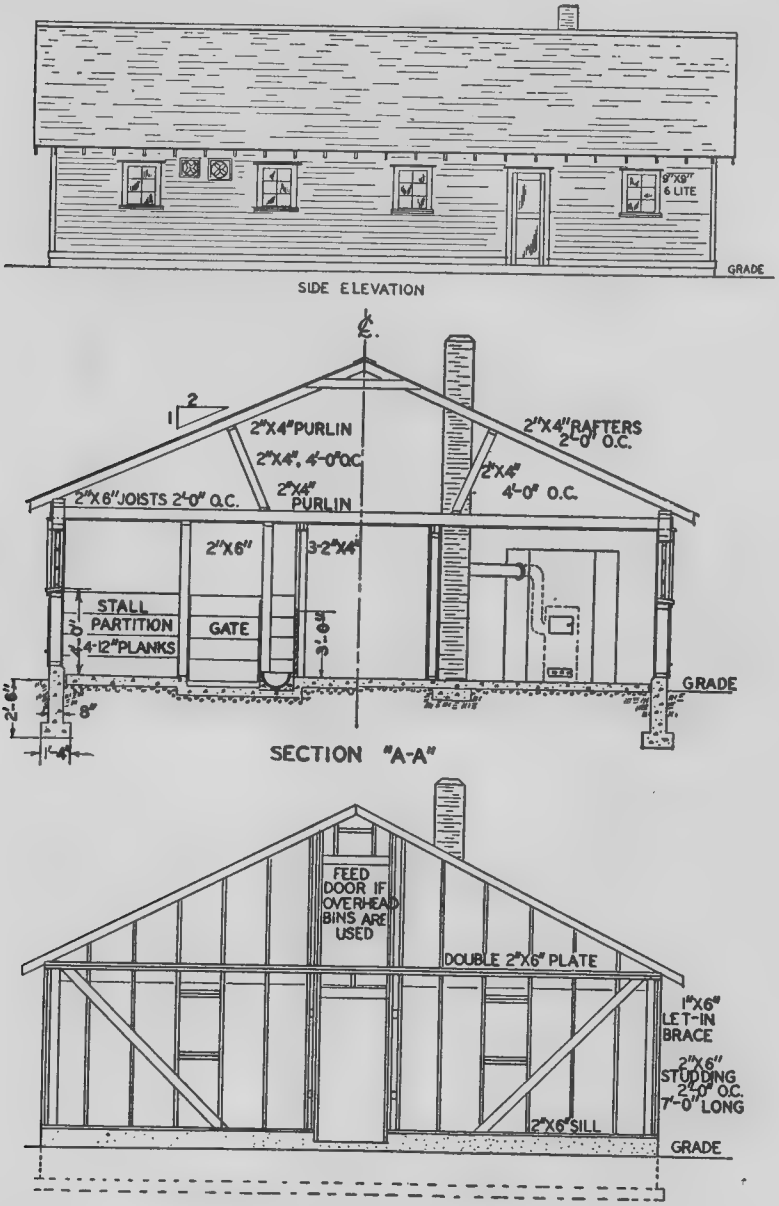
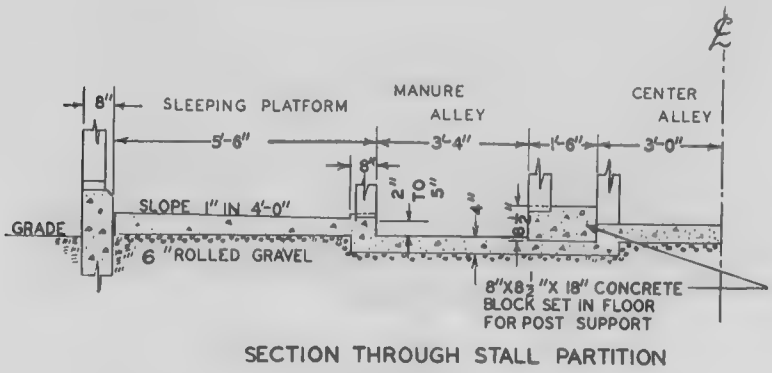



**Fig. 23.**—A side elevation, section through "A-A", and end framing of the barn shown in figure 22.




SECTION THROUGH STALL PARTITION

**Fig. 24.**—Cross section through the stall partition of a feeder pen shown in figure 22.

## Ventilation

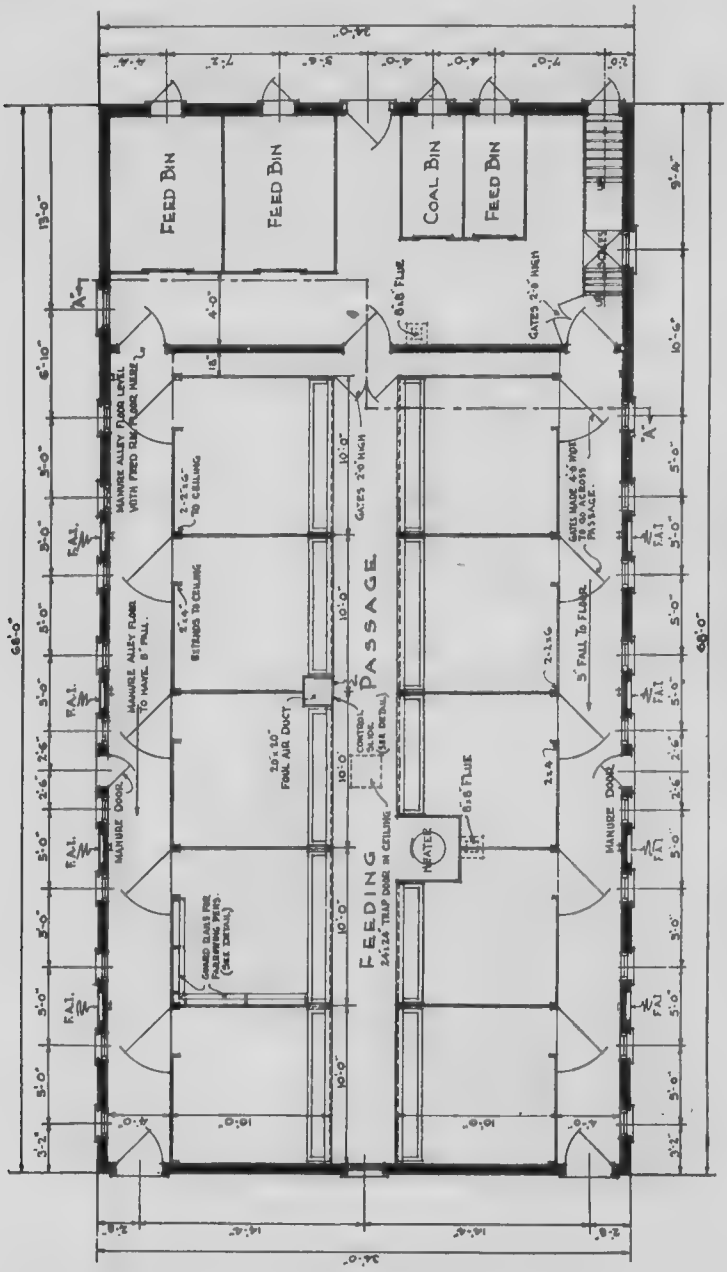
The importance of good ventilation cannot be over emphasized. Pigs are particularly susceptible to ailments arising out of a damp environment, and it is very important that the air in a piggery be kept comparatively dry. Ventilation removes the moisture given off by the hogs, and is the only practical way of keeping a piggery dry.

There are two types of ventilating systems used, both of which are satisfactory. These are mechanical or fan ventilation, and natural draft ventilation.

### Fan Ventilation

Where power-line electricity is available, the use of fan ventilation is recommended. In this system an exhaust fan draws the warm, damp air from the building, and fresh air enters through small inlet openings located around the walls near ceiling level—see Fig. 31. Either one or two fans may be used. If a single fan is used, its capacity should be about 60 c.f.m. (cubic feet per minute) for each 1000 pounds of hogs in the piggery. As an example, if a piggery housed fifty 200-pound hogs, a 600 c.f.m. fan would be required. If a single fan is used, it should be provided with a manually controlled shutter or louvre, so that the output can be regulated by opening or closing the louvre.

Figure 32 shows a two-fan installation. In this system, one fan runs continuously, while the other is thermostatically controlled to cut in at temperatures of 45 to 50 degrees. This arrangement is useful in that it offers temperature control in addition to ventilation. When the temperature in the piggery rises above the thermostat setting, the second fan cuts in and draws off warm air until the




FLOOR PLAN

Fig. 25.—Floor plan of a Danish-type piggery. Detailed building plans are available from the University of Alberta or the Provincial Department of Agriculture.

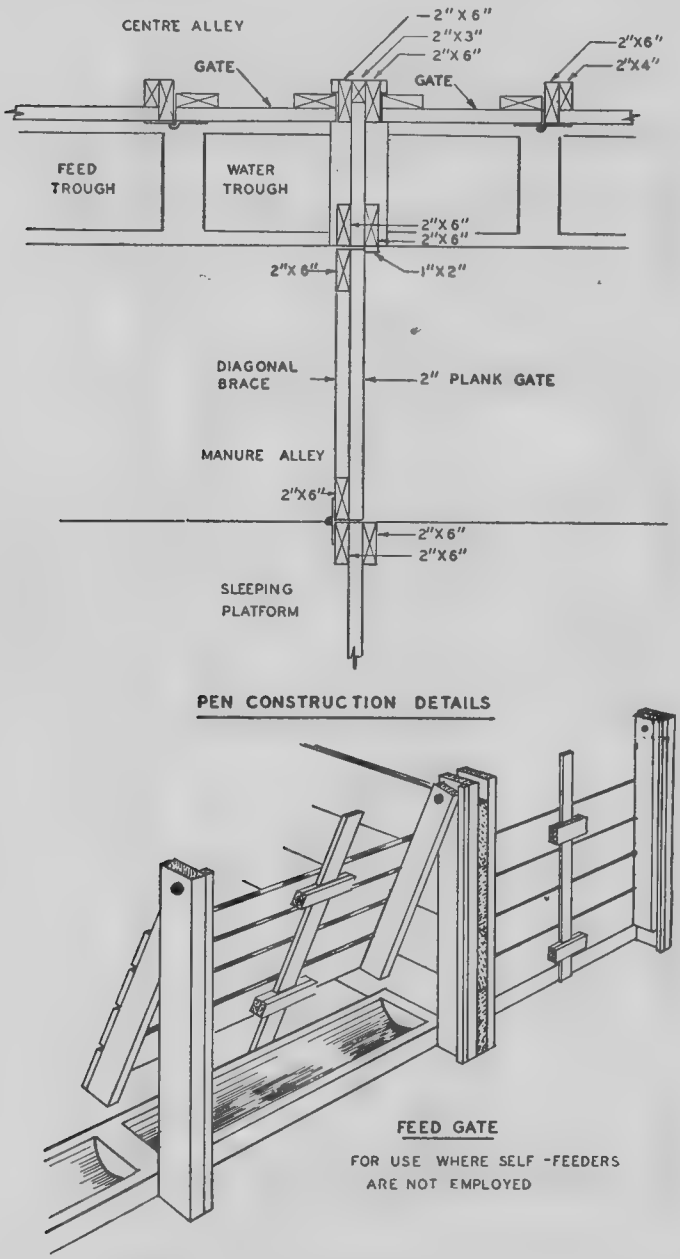



**Fig. 26.**—Pen construction details; and feed gate where self-feeders are not employed.

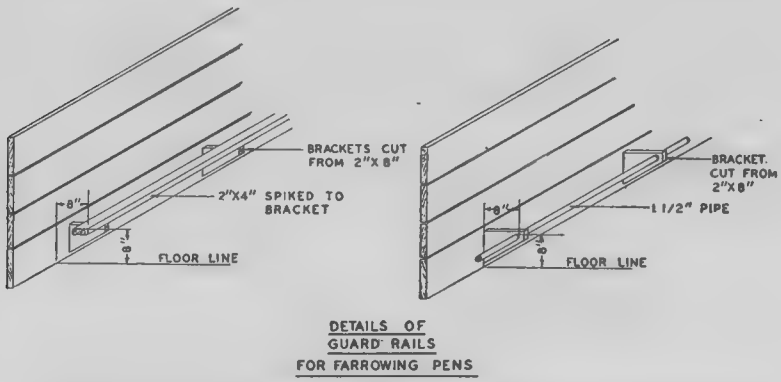



**Fig. 27.**—Details of farrowing pen guard rails to prevent the sow from crushing the young pigs.

temperature is lowered. In a two-fan system, the continuously running fan should have a capacity of 40 c.f.m per 1000 pounds of hogs, while the thermostatically controlled fan should have a capacity of 60 c.f.m. per 1000 pounds of hogs. The intermittent fan should be provided with an automatic louvre placed on the inside of the fan.

The exhaust fan, or fans, should be located on the side of the piggery away from the prevailing winds.

### Natural Draft Ventilation

If power-line electricity is not available, the exhaust fan may be replaced by a single out-take flue. Figure 33 shows the construction of an outlet flue.

As with the fan system, the size of the flue should be determined by the weight of hogs in a building. Of course the flue should be designed for the maximum number of hogs a piggery would hold. When not full, the ventilating rate can be reduced by partially closing the control slide.

Table XVIII gives the cross-sectional area of the out-take flue.

TABLE XVIII

FLUE AREAS NEEDED FOR VARIOUS NUMBERS OF MARKET WEIGHT HOGS

| Number of 200-pound hogs in piggery | Height in feet from floor to ridge of piggery | | |
|---|---|---|---|
| | 20 | 25 | 30 |
| | Flue area (square inches) | | |
| 20 | 215 | 180 | 160 |
| 30 | 260 | 220 | 200 |
| 40 | 345 | 290 | 265 |
| 50 | 430 | 362 | 318 |
| 60 | 518 | 435 | 382 |
| 70 | 604 | 507 | 445 |
| 80 | 690 | 580 | 510 |
| 90 | 776 | 654 | 573 |
| 100 | 864 | 762 | 637 |

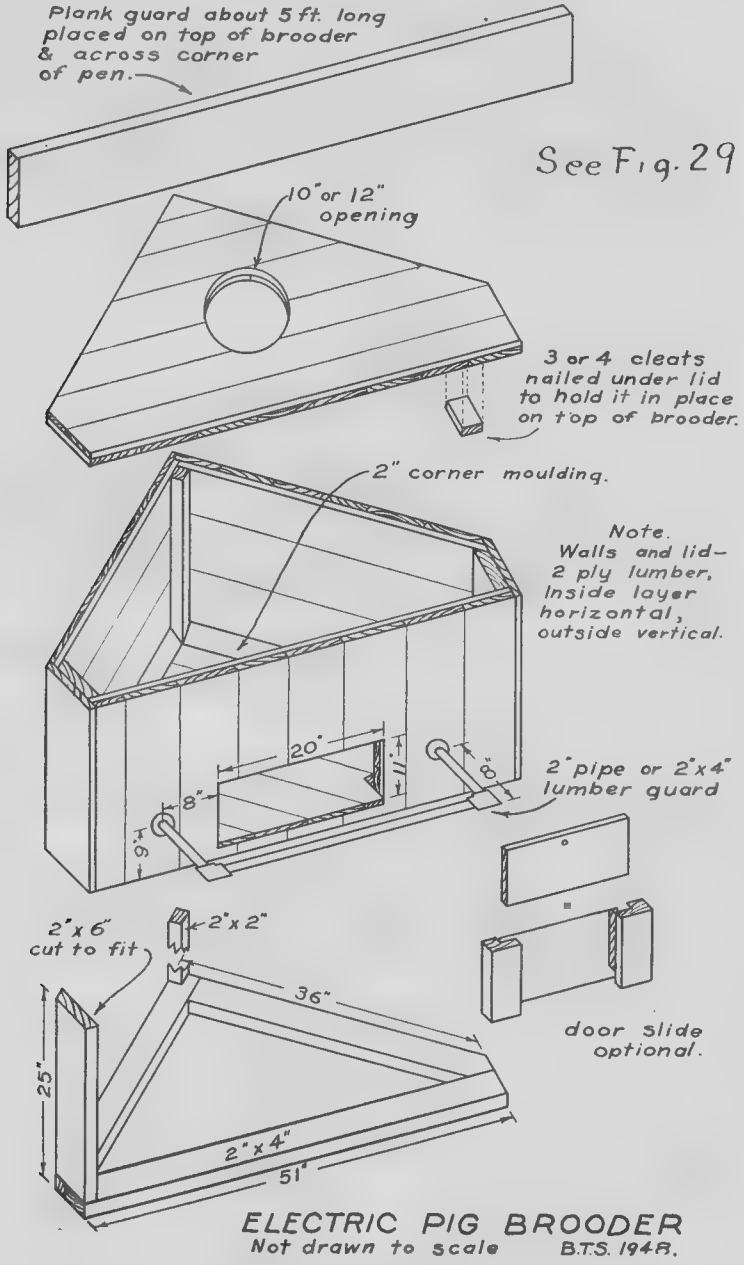



**Fig. 28.**—Electric pig brooder.

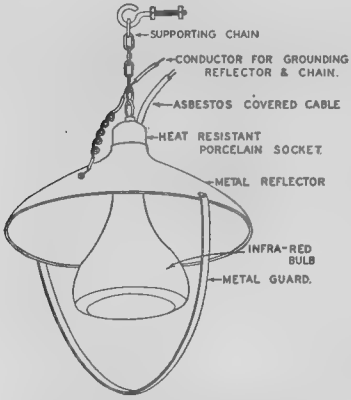



**Fig. 29.**—Infra-red heat lamp for pig brooders showing set-up to comply with the Rural Wiring Regulations of the Province of Alberta.

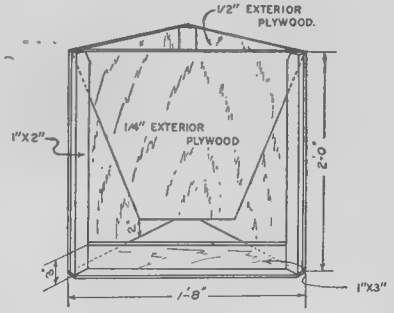



**Fig. 30.**—Self-feeder to be used in creep feeding.

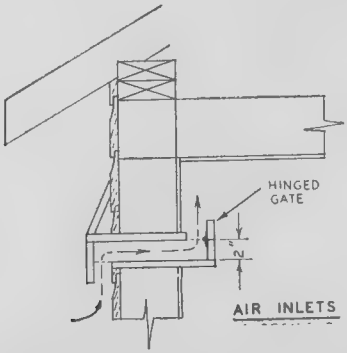



**Fig. 31.**—Fresh air inlets for use with either fan ventilation or natural draft ventilation.

The out-take flue may be located at any convenient place in the building, usually in the corner of a pen. It must be well insulated, and should run straight up without any bends or offsets.

As with the fan system, fresh air inlets similar to those shown in Fig. 31 must be provided. The total inlet area should be three-quarters of the area of the out-take flue. From this, the number of inlets can be determined.

## Insulation

It is very important that an insulating material be placed in the walls and ceiling of a piggery. Insulation serves two purposes. It retains the heat given off by the hogs, and so results in a much

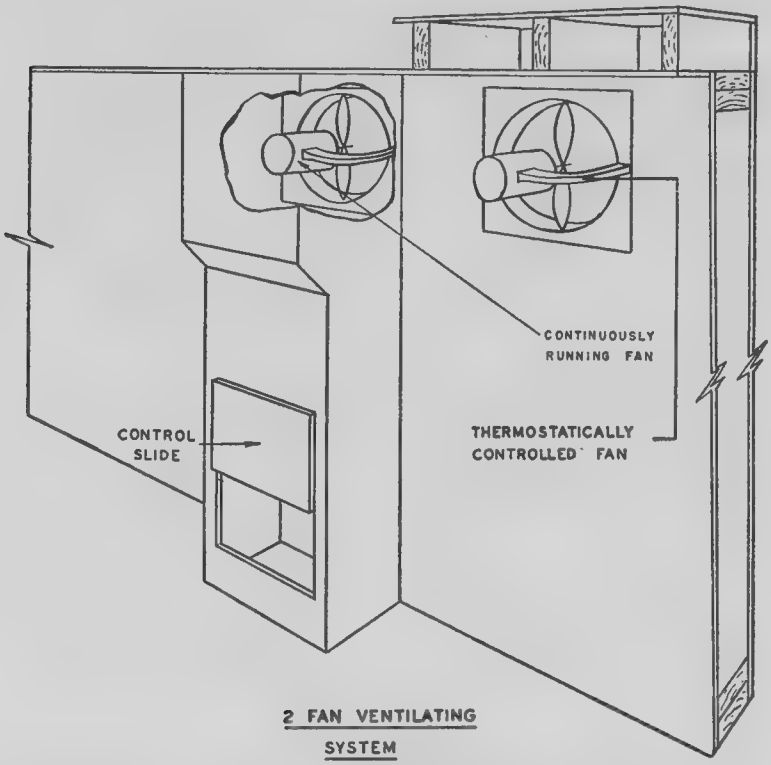



**Fig. 32.**—Two-fan ventilating system for use where power-line electricity is available.

warmer, more comfortable building. It also raises the inside surface temperature of the walls and ceiling, thus helping to eliminate condensation and frost from forming on these surfaces. There is no question that a farmer is many times repaid the original cost of the insulation, both in fuel savings and in better animal health.

Dry planer shavings or commercial insulation can be used satisfactorily. If shavings or other loose-fill insulation is used, it tends to settle in the wall. Figure 34 shows a type of wall construction which allows more insulation to be added to the stud spaces if the insulation settles.

The insulation must be protected from moisture. This is easily accomplished by placing vapor barrier paper over the studs and ceiling joists, under the inside sheathing—see Fig. 34. As an added protection, louvres should be provided in the gable ends of the building to allow free air circulation in the attic.

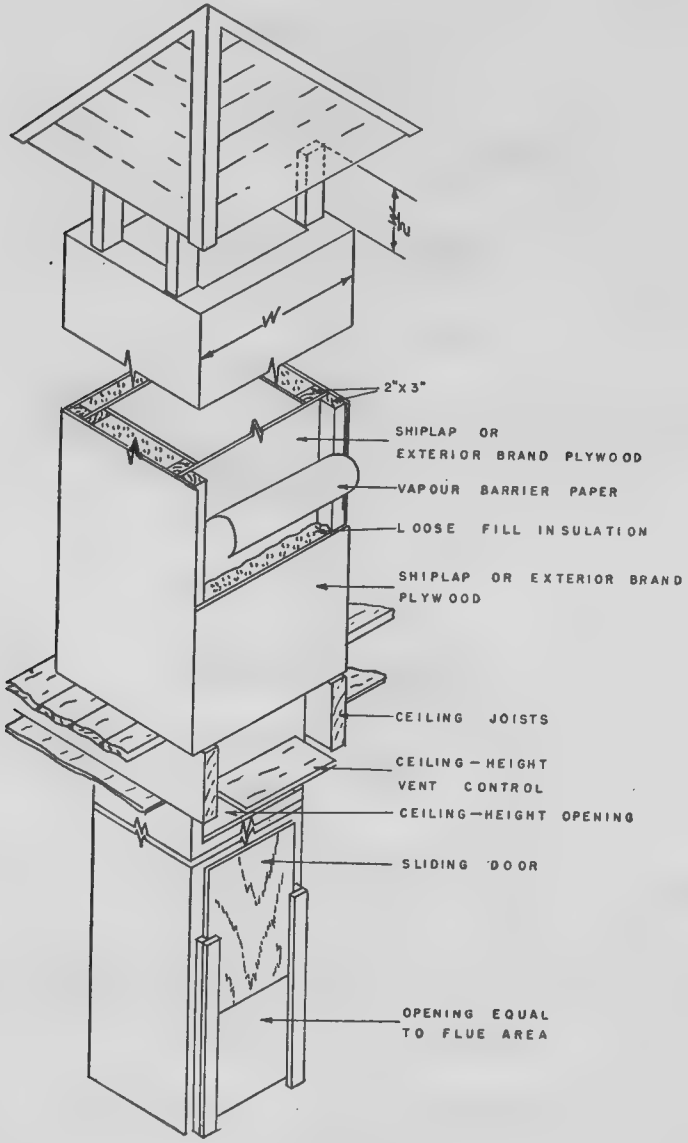



**Fig. 33.**—Construction details of an out-take flue for natural draft ventilation.

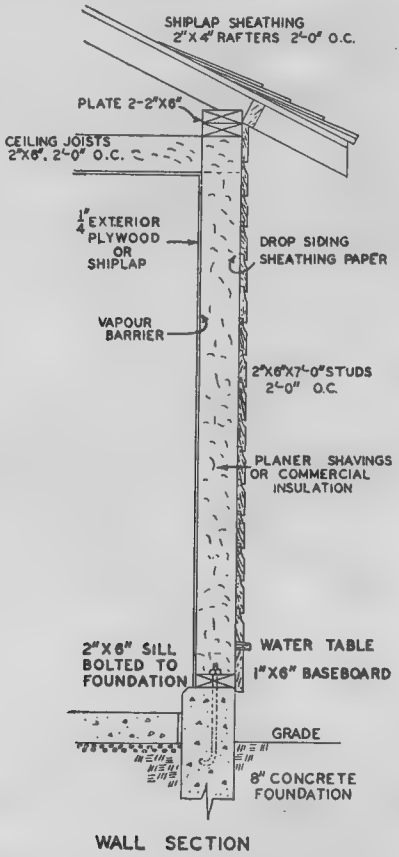



**Fig. 34.**—Wall section of a hog barn showing construction details. Note location of the vapor barrier paper.

## Heating

Hogs do not give off enough heat to maintain a desirable building temperature during severe weather such as is encountered in Alberta winters. For this reason supplementary heat is required in a piggery.

Various types of heaters may be used but a circulating type of heater is the most effective in distributing the heat through the entire building. The heater may be located at any convenient location in the piggery; however, it should preferably be as close as possible to the farrowing pens.

Some piggeries have the heating unit located in a pit or basement under the building. This location is desirable if an air space is provided under the floor. It is very effective in providing warm floors.

Providing heat for young pigs in creeps is outlined on pages 74 and 75.

## Colony Houses

Several types of colony houses have been used on the University Farm, but the gable type house shown in Fig. 20 has been found the most satisfactory. This house, either 6′×8′ or 8′×10′, can be used practically all the year round. Sows and litters can be accommodated in such houses in the spring after having been removed from the farrowing house, pigs on pasture may be sheltered in them, and when banked with straw they will accommodate fall pigs and brood sows during the winter months. Being portable, they may be moved to fresh ground from time to time and thus assist in avoiding parasitic infestation.

The house shown in Fig. 35 is mounted on 3″ to 4″×4″ runners on which the floor is laid, the framing being erected as shown in the illustration of framing details—Fig. 36. Very little further explanation is needed. The first illustration shows the side and end elevations as well as the plan.

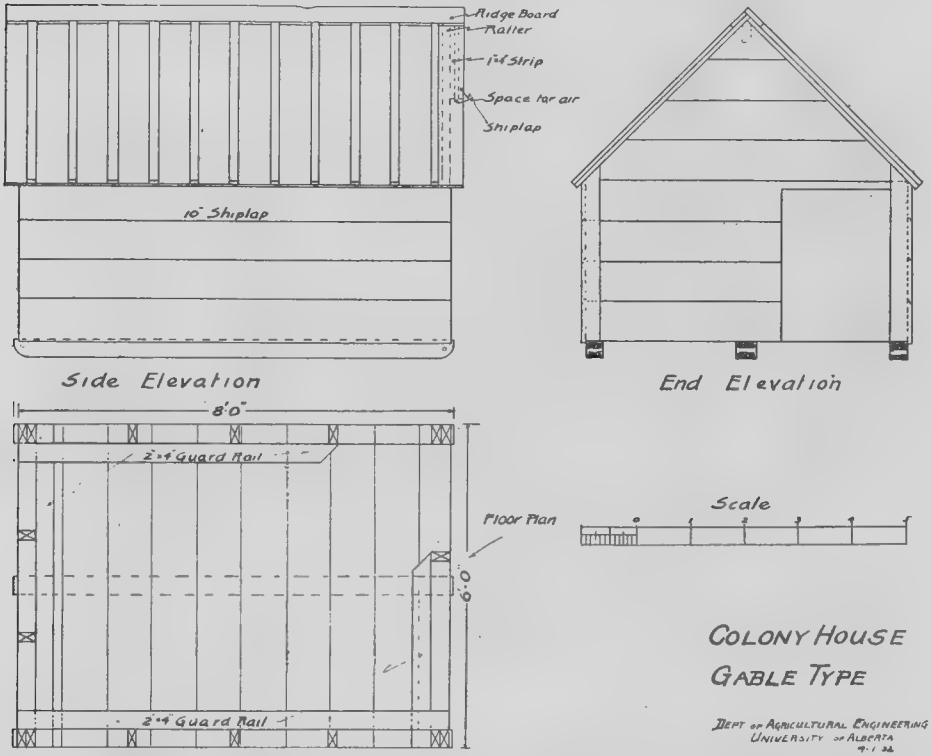



**Fig. 35.**—Plans for construction of 6′×8′ Gable-Type Colony House

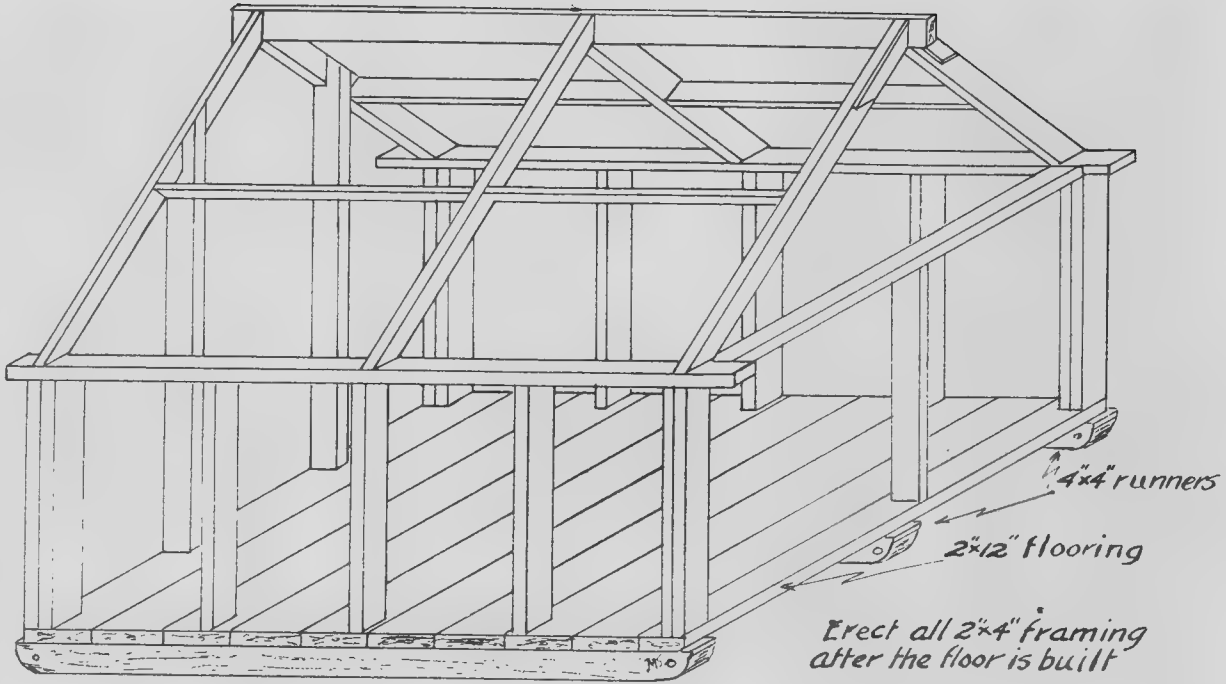



**Fig. 36.**—Framing details for 6′×8′ Gable-Type Colony House.

Shed-type colony houses are slightly cheaper to construct and are very useful. Plans for this type of house are available from the Alberta Department of Agriculture.

### Pig Brooder House

In an effort to assist swine raisers who wish to have sows farrow during the winter months and who desire special farrowing quarters, a pig brooder house has been designed by the Canada Department of Agriculture officials working in co-operation with practical Alberta pig producers.

This brooder house, which has been used with satisfaction by a large numbers of farmers, is a six-sided building with six farrowing pens which taper to the centre. A chick brooder stove is located at the centre and provision is made for the small pigs to have access to the heat from this stove and at the same time secure protection from trampling or damage in other ways.

Information regarding the construction of this building may be secured through the Canada and Alberta Departments of Agriculture.

## GENERAL HOG EQUIPMENT

### Self-Feeder for Grain

The self-feeder shown in Fig. 37 is a one-way type, that is the pigs feed from one side only. This feeder is large enough to accommodate from ten to twelve pigs. It might be extended to accommodate a large number of pigs, and modified so that pigs could feed from both sides—see Fig. 40.

Attention is drawn to the depth of the feed trough and to the spacing strips across the trough. These strips serve to prevent the pigs from rooting the grain out of the trough. A feeder built according to the plan suggested, and when mounted on a platform, will function with a minimum wastage of grain.

In order to make the details of construction clear, a separate cut has been made showing the framing—see Fig. 38.

The galvanized steel sheet which is shown in the sectional view is very important, and makes a good smooth surface for the grain. The construction of the roof and hinges is very important in order to prevent any leakage of water. It is cheap and easily built; a strip of prepared roofing is nailed on to the shiplap and held by strips of lath. Over the hinge another piece of prepared roofing is nailed, making a watertight joint.

Another type of self-feeder for minerals is illustrated in Fig. 42.

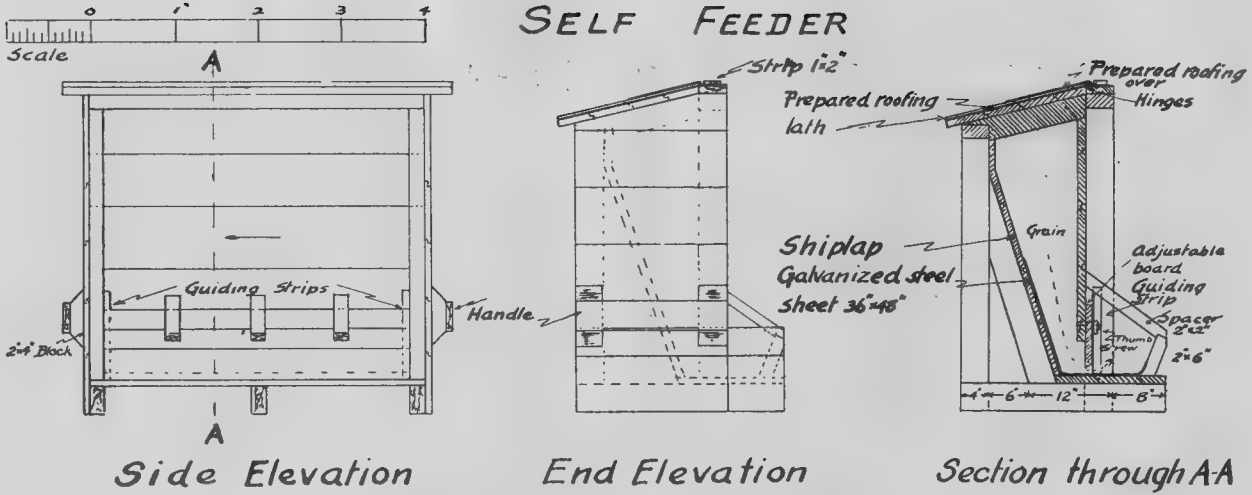



**Fig. 37.**—Plan for one-way self-feeder for grain.

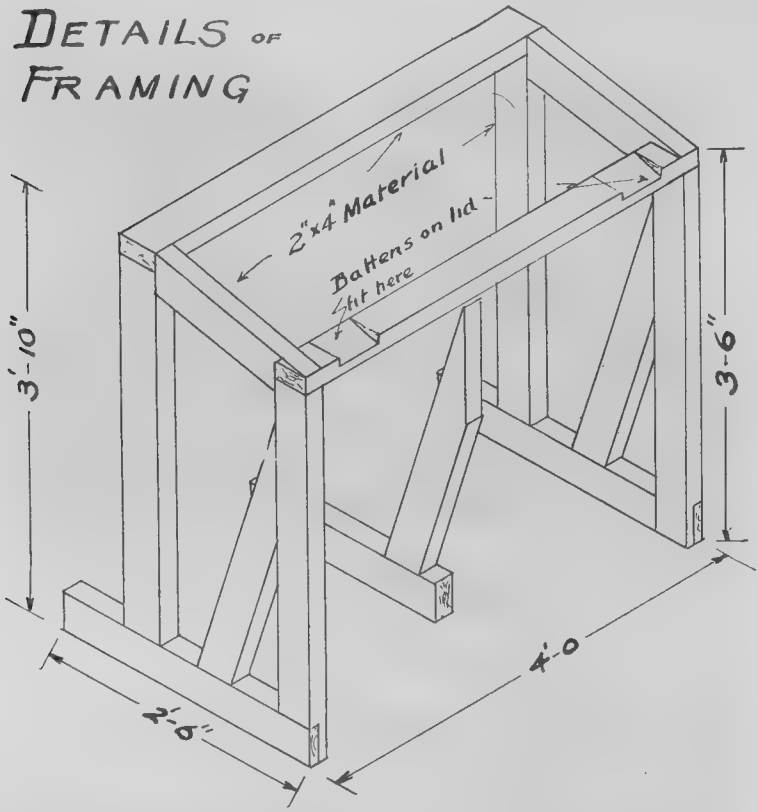



**Fig. 38.**—Details of framing of self-feeder for grain shown in Fig. 37.

### Hog Shipping Crate

Breeders of purebred pigs will have occasion to ship pigs to purchasers. Pigs must always be crated, and shipping companies will not accept pigs for shipment unless the crate is well made.

The crate shown in Fig. 39 can be made to suit the size of the pig. The illustration shows a crate that is strongly constructed and will stand shipping well. It will be noticed that most of the boards are 1″×4″ material, with the exception of the two lower boards on the sides and the door and top. The runners are made of 2″×2″.

**Fig. 39.**—Plan showing construction of a hog shipping crate.

## Hog Weighing Equipment

The use of some type of scale for weighing hogs as they approach a marketable stage, is almost a necessity if they are to reach market at the correct weights. This matter has been given careful consideration by both Federal and Provincial Governments and types of equipment for weighing hogs on the farm have been designed. Plans for a home-made hog weigher may be obtained from the Extension Service, Alberta Department of Agriculture, Edmonton.

A simple, inexpensive scale specially designed for weighing hogs on the farm, may be purchased through the Canada Department of Agriculture. Information regarding this scale may be obtained from the District Fieldman, Livestock Production Service, Canada Department of Agriculture, Edmonton.

**Fig. 40.**—Pigs at self-feeders. Note the one-way self-feeder of the type shown in figure 37, together with a two-way self-feeder.

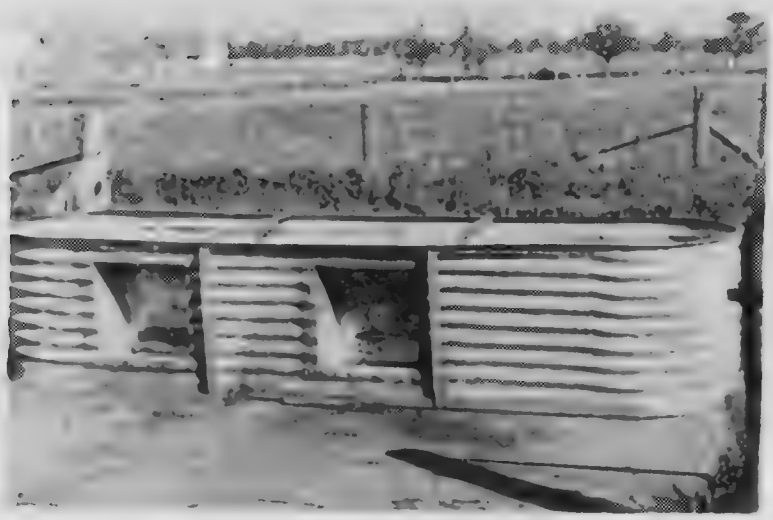


**Fig. 41.**—An automatic waterer reduces labor and keeps water in front of pigs during the summer months.

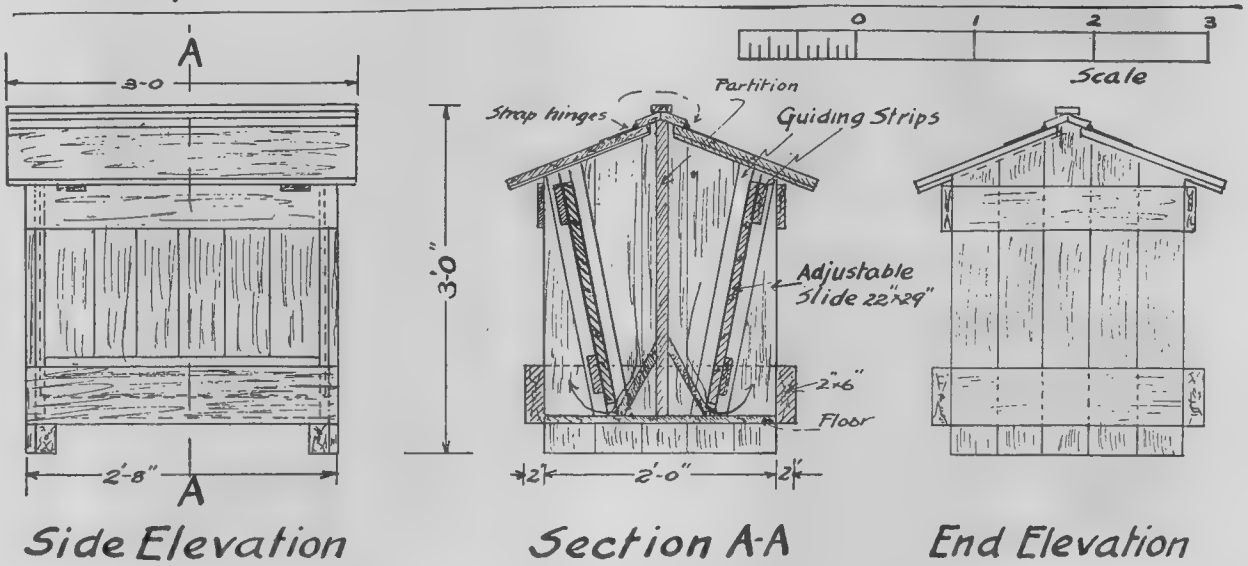



Fig. 42.—Plan for construction of small self-feeder for minerals for pigs.

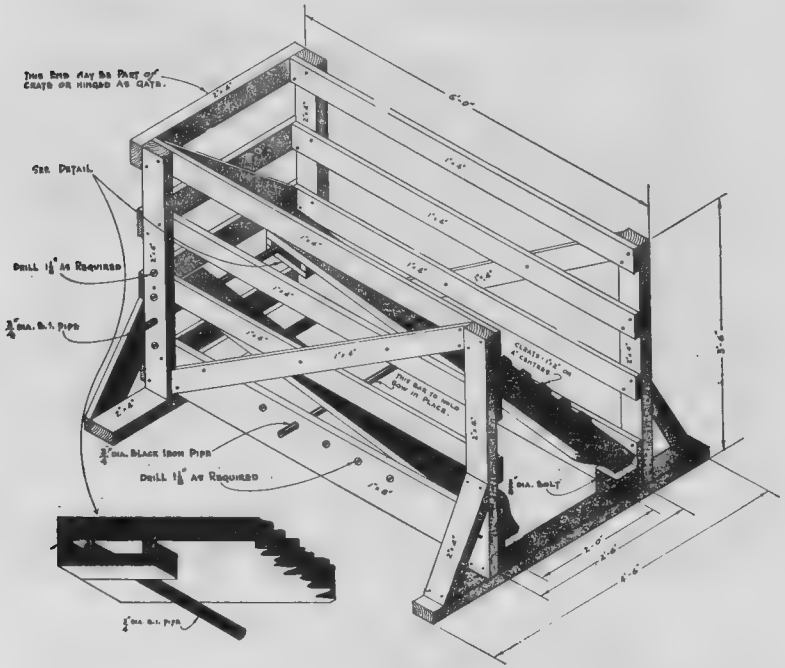

THIS END MAY BE PART OF CRATE OR HINGED AS GATE.
SEE DETAIL
DRILL 1⅛" AS REQUIRED
¾" DIA. G.I. PIPE
¾" DIA. BLACK IRON PIPE
DRILL 1⅛" AS REQUIRED
⅝" DIA. BOLT
¾" DIA. G.I. PIPE

Fig. 43.—Breeding crate.

## Hog Breeding Crate

It occasionally happens that a small sow must be mated to a large, mature boar. If the sow is not sufficiently developed to support the weight of the boar, the breeding crate shown in Fig. 43 may be utilized to good advantage. As is illustrated in the above plan, supplied through the courtesy of the Provincial Department of Agriculture, the supports for the feet of the boar may be raised or lowered by adjusting the level of the ¾" iron bar at the front of the crate. The other iron rod which slips through holes in the bottom side boards should come just above the hocks of the sow so that she is prevented from backing out of the crate.

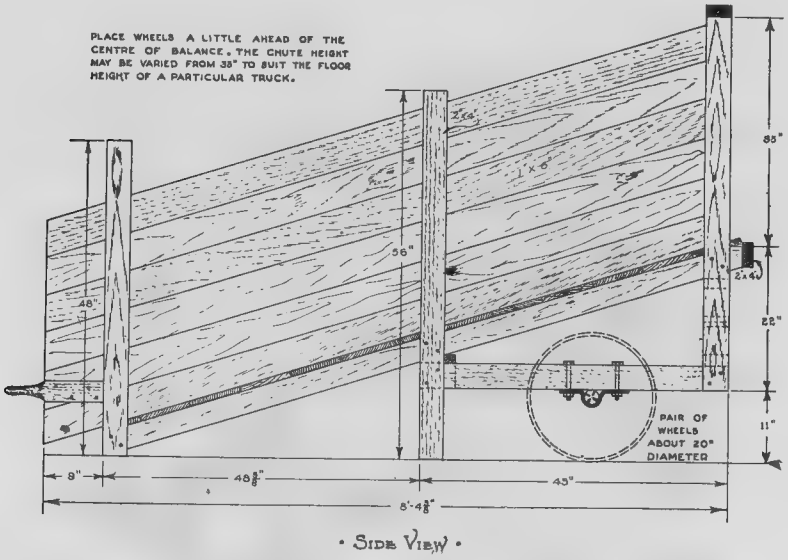



**Fig. 44.**—Portable loading chute. When connected with a narrow runway, this piece of equipment makes the job of loading pigs an easy one.

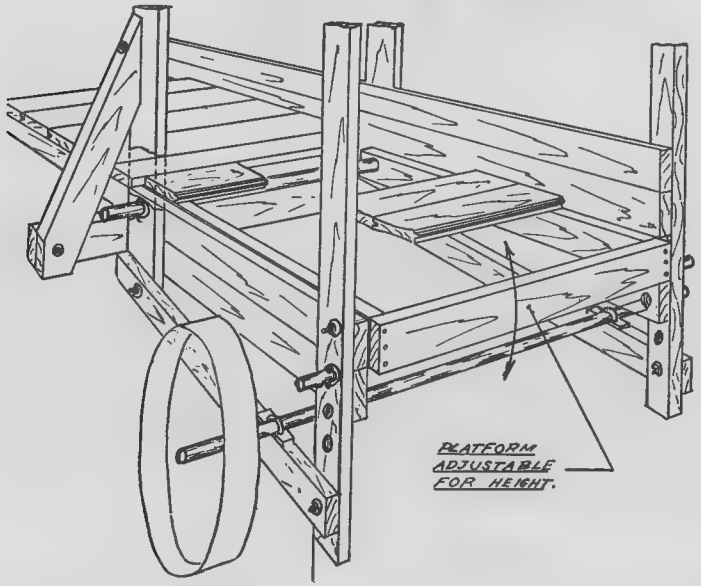



**Fig. 45.**—Details of a loading chute designed so that the loading ramp may be raised or lowered to accommodate trucks of varying heights.

APPENDIX B

# Swine Diseases

BY

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Despite the fact that many of the diseases of swine can be prevented, the disease loss among swine in Alberta is extremely high. There are diseases which may occur in swine herds maintained under ideal conditions. The records of the Provincial Veterinary Laboratory in Edmonton reveal, however, that approximately half of the swine specimens submitted for examination are either the direct or indirect result of errors in feeding and management. Swine producers must realize that drugs, medicine and vaccines are not the only things to be considered in so far as swine diseases are concerned.

## VETERINARY SERVICES

It is strongly recommended to all swine producers to obtain the advice and services of a Veterinarian when sickness appears in their hogs. This is impossible in some districts of Alberta, but where such services are available it is in the producer's own interest to have professional advice.

A Veterinary Laboratory is maintained in Edmonton by the Alberta Department of Agriculture as a public service. Its facilities are available to all livestock producers in the Province, free of charge. When animals are sick or dying a specimen should be submitted to the Laboratory for examination. It is important that animals should arrive at the Laboratory as soon after death as possible. A live sick animal is preferable. If dead, the carcass should be packed in ice and sawdust, and addressed to the **Alberta Veterinary Laboratory, Department of Agriculture, Edmonton, Alberta.**

## SANITATION AND DISEASE CONTROL

Sanitation is of prime importance in the control and prevention of swine diseases. In the study of the spread of disease and internal parasites we find that the most common means of dissemination are contaminated litter, soil and feeding utensils. A diseased

animal may be constantly spreading the disease germs in manure, urine or nasal discharges. Pigs allowed to run in the same pastures and yards year after year are living with an accumulated surplus of disease germs and parasites. The same applies with equal force to dirty pens and barns.

Considering this, the necessity of hog yards and pens that are easily cleaned, feed troughs and drinking utensils protected from contamination, and rotation of pastures can be readily understood. Clean ground for clean pigs is a worth while axiom. When disease does occur, segregation of sick animals, plus cleaning and disinfection of premises is the only logical procedure to be followed.

## CARE OF THE PREGNANT SOW

Strong healthy, vigorous litters are to a large extent dependent upon the care and feeding of the pregnant sow. Besides the requirement for her own maintenance, there is the need of the developing unborn piglets. When one considers the development of eight or more little pigs in a little less than four months it is easy to understand how a shortage of the necessary vitamins and minerals in the ration of the pregnant animal is reflected in the newborn. Less difficulty may be experienced with animals farrowing in summer months when there is an abundant supply of green feeds, clovers and alfalfa. In the winter months the food requirements are not so easily met, and it is necessary to supplement the ration.

The proper feeding and management of pregnant sows is described on page 47 of this bulletin.

## NUTRITIONAL DEFICIENCY DISEASES

### Vitamin A Deficiency

Vitamin A is often called the anti-infection vitamin. It is necessary for the maintenance of the tissue which lines the digestive and respiratory tracts. A deficiency of vitamin A in the diet of the pregnant sow will result in litters that are also suffering from a lack of this important vitamin. Pigs may be born dead, or lacking the necessary vigor and vitality for development into good growing hogs. It is known that a lack of vitamin A will make little pigs more susceptible to scours. Vitamin A deficiency is more prevalent during the winter months when fresh green pasture is not available.

Vitamin A is present in fresh green feeds, and in properly cured clover and alfalfa hay. It is probably best, especially in winter months to supply it to the pregnant sow in the form of a good quality feeding oil or dry vitamin A premix, see page 38. One tablespoonful a day of an oil containing 1,200 units of vitamin A per gram is suf-

ficient. Affected litters will often show remarkable improvement when a vitamin A oil is administered daily. Fish oils are fed to sows on many Alberta farms. As a result litters have been more vigorous and healthy.

### Scours or Diarrhea of Suckling Pigs

The cause of scours in suckling pigs is not fully understood. It may result from a number of causes but rarely, if ever, does it appear to be caused by disease-producing germs. The vitamins A and B-complex are certainly factors in the condition. These would point to the importance of care and feeding of the pregnant and nursing sow. Scours occur most frequently where the standard of sanitation is not good.

The main symptom is a white, watery diarrhea. Little pigs may die before the scouring is noticed by the owner. The pigs are listless, shrink rapidly and either die or remain stunted and unthrifty.

Treatment is useless if the causative factors are not corrected. More often than not it is the result of errors in feeding or management. The reader is referred to the section of this bulletin dealing with the pregnant and nursing sow on pages 46 to 56.

To control the scours reduce the sow's feed immediately. For a day it is advisable to feed only a little shorts or feed flour mixed with equal parts of lime water and milk. Gradually bring her back to full ration to which is added three tablespoonfuls of dried brewer's yeast daily. If fish oil is not already included in the ration, add one ounce daily. The little pigs can be given a teaspoonful of brewer's yeast daily for several days.

Commercial preparations, containing antibiotics and vitamin $B_{12}$ are now available which appear to have a decidedly beneficial effect on scours—see page 40.

Remember the importance of clean pens.

### Hairless Pigs—Goiter

The thyroid gland of any animal is necessary to maintain life, and its function is dependent upon a supply of iodine. The amount of iodine required is very small and in districts where iodine is present in the soil animals receive sufficient amounts of it in their natural food. However, in localities where there is a lack of iodine in the soil, iodine must be supplied, or goiter or iodine deficiency will result. In these areas the thyroid gland fails to function properly. The thyroid gland is functioning in animals before birth, and if the pregnant animal is suffering from iodine deficiency the young will be similarly affected.

Little pigs, as a result of iodine deficiency, are born without hair, have a puffy skin and usually are thick around the neck. They are often dead at birth, or die within a day or two.

The disease is easily prevented by supplying iodine in sufficient amounts to the pregnant sow. It is usually provided in the form of iodized salt. If iodized salt does not prove adequate, dissolve one ounce of Potassium Iodide in a gallon of water and give one tablespoonful of this solution daily in the feed. A solution may be made with seven ounces of Potassium Iodide in a gallon of water, and give a tablespoonful once a week to the sow. The solution must be kept in a glass or enamelware container.

### Anemia of Suckling Pigs

Anemia of suckling pigs occurs as a result of a deficiency of iron. Iron constitutes an important part of the blood and without it the blood is unable to carry out its proper function of supplying the body with food and oxygen. Anemia of little pigs is the cause of substantial losses annually.

The iron necessary for life is present in the soil, and animals that are on pasture usually receive sufficient amounts. Before birth the little pigs receive all that they require from the blood of the mother. Sow's milk contains little iron, and from birth until they begin to eat regularly the pigs have a deficient supply of available iron. This is most marked in winter litters which do not have access to pasture or soil and in litters raised in floored pens, particularly of concrete. Thus at the most important stage of life and development conditions occur which may cause death or weakness which will render them more susceptible to other diseases.

The anemia is usually apparent within a week of birth. In white breeds the skin is noticeably pale, the hair is dull and lacks luster and sheen. The ears which are normally pink become white. The little pigs may show listlessness and lack the playful energy observed in healthy litters. In severe cases there is evidence of rapid or labored breathing, a condition sometimes termed "thumps". Anemia will cause death.

Anemia is preventable by supplying available iron to little pigs for that period from birth until they begin to eat. There are several methods by which this may be accomplished:

Fresh sods may be dug and placed in the pens twice a week. The little pigs will root in this and obtain sufficient iron. These sods may be fortified by sprinkling with a solution of iron sulphate, made by dissolving one ounce of iron sulphate in a quart of water.

Iron may be supplied to the pigs individually in the form of "reduced iron." The dose is estimated at being an amount which would cover half a ten cent piece. They should be given the first dose when they are three days old, and the dose repeated at weekly intervals for three weeks or until they are eating regularly. The

reduced iron is placed well back in the pig's mouth. Do not throw it in as some may go down into the lungs.

Commerical preparations are available in which iron is incorporated with copper. These preparations are used in a similar manner to reduced iron.

### Rickets, Stiffness, Crippling

The weaning period is a critical one for little pigs. They are changing from the natural sow's milk, rich in the vital minerals and vitamins, particularly calcium and phosphorus, and vitamins A and D, to artificial feed mixtures.

Weanling pigs that are on a diet lacking in these vitamins and minerals will become listless, bunch up and show reluctance to move about. There may be evidence of fits or convulsions, followed by stiffness of the joints and crippling in advanced cases. This is usually noticed about a month after weaning. The condition is purely nutritional in origin. Provided with proper care and feeding, pigs should never be affected with this condition. Follow recognized rations and feeding practices as outlined in previous sections of this Bulletin. And remember, too, that while a deficiency of calcium or vitamins at this time might not be great enough to produce marked symptoms, it may be sufficient to lower the resistance to other diseases, with results equally as disastrous.

### Failure of the Sow to Milk

On occasions the little pigs are born but the sow fails to supply milk for them. The cause probably has its origin in improper feeding of the pregnant animal. The condition can usually be corrected by the use of calcium preparations and special hormones administered by a Veterinarian. The owner can help by administering a laxative of raw linseed oil and putting the sow on a sloppy laxative diet for a day—see page 52.

### Paralysis of the Hind Quarters

Paralysis of the hind quarters occurs occasionally in swine; most often in brood sows at any time during pregnancy up until the litter has been weaned.

The cause is thought to be a lack of calcium, phosphorus and essential vitamins.

The condition is gradual in its onset, and is first marked by an apparent weakness of the hind quarters, which becomes more marked until it assumes a true paralysis. The animal keeps its appetite and remains bright.

Sows so affected may sometimes be brought back to their feet

with the use of calcium preparations, but this requires the services of a Veterinarian.

The sow, when down, should be given a laxative diet with an ample supply of green feeds. In winter time a good grade of feeding oil should be supplied. Lime water is beneficial in that it supplies calcium. Ground limestone or bonemeal are also good sources of calcium, and are very easily mixed into the feed.

Prevention is much more certain than the cure. The pregnant sow must receive a good nutritious ration, rich in the essential minerals, calcium and phosphorus. In winter months when fresh green feed is not available, supply the vitamin A and D with a good quality feeding oil. Exercise of the pregnant animal is another factor which must not be neglected, even in the cold winter months —see pages 46 to 56.

**Fig. 46.**—A typical pig suffering from enteritis. Note the thin, gaunt appearance and rough hair coat. Diarrhea is an accompanying symptom.

## INFECTIOUS DISEASES OF SWINE

### Swine Enteritis (Diarrhea)

Swine are subject to several types of enteritis or inflammation of the intestinal tract. Enteritis is responsible for more disease losses than any other single disease condition in Alberta. Some forms are caused by specific disease-producing germs while others are a result of errors in feeding and management. The so-called "necrotic enteritis" is a very severe or advanced type of enteritis in which the lining of the intestines is eroded and necrotic.

A pig starter too high in fiber, usually oat hulls, is one of the commonest causes of enteritis. We know too, that the disease is often associated with unsanitary conditions. The use of the same ground year after year for raising pigs results in the soil becoming heavily contaminated with disease germs. The growing pigs are constantly exposed to them. Internal parasites are a source of irritation to the intestinal tract and help to set up conditions favorable for an outbreak of enteritis. The importance of feeding and management practices cannot be disregarded.

While diarrhea is a constant symptom, an owner often fails to notice it. Affected pigs lose flesh rapidly, becoming gaunt and very rough looking. Some pigs will die in a few days, other survive for longer periods and some will remain stunted and unthrifty for life—see Fig. 46.

Though not too common in Alberta, there is an enteritis of pigs caused by specific disease-producing germs which will cause severe losses. Scouring is a symptom but animals will sometimes die suddenly without showing much loss of condition.

**Treatment and Control**

Since enteritis may result from a number of different causes, it is essential that an accurate diagnosis be made early and the causative factors determined and eliminated. If possible procure the service of a Veterinarian.

In general, sick animals should be separated from the healthy ones and a good standard of sanitation maintained.

Animals may be given a laxative of raw linseed oil. The animals are fasted overnight and the oil is put in feed troughs. The amount may be estimated at two cupfuls of oil per 100 lb. of live weight. A good grade feeding oil and two tablespoonfuls of brewer's yeast per pig per day for a week or ten days may be fed, and the ration gradually brought back to a full fattening one.

Commercial preparations containing vitamin $B_{12}$ and antibiotics are now available and have proven to be highly successful in the treatment of some types of enteritis.

In cases where specific disease germs are responsible the sulfa drugs, sulfamerazine or sulfamethazine, used according to the manufacturer's directions, are the treatment of choice.

On premises where the disease re-occurs young animals may be innoculated with an enteritis bacterin or vaccine. However, improved sanitation and clean ground are more important than the use of bacterins.

## Pneumonia

Swine are commonly affected with diseases of the respiratory tract and pneumonia. These diseases are more prevalent in the colder seasons of the year, and among animals kept in dark, damp, draughty, poorly ventilated pens and stables. We find it occurring in animals following shipping, after exposure to cold wet chilling weather, and under all conditions which tend to lower the resistance of the animal. Some pneumonias are infectious and will spread from animal to animal, and from farm to farm. Hemorrhagic Septicemia and Swine Influenza are specific instances, and any respiratory disease occurring in pigs should be regarded with suspicion. Care should be exercised in bringing new animals into the yard, since animals may be coming from infected premises or through infected stockyards.

Pneumonia is quite evident when it occurs. Affected pigs have a high fever, lose their appetite and are noticeably sick. The breathing is rapid and labored and some animals may be coughing. Sometimes there is diarrhea.

### Treatment and Control

If veterinary service is available it should be used. In treatment of all respiratory infections hygiene is most important. Provide the animals with clean dry quarters protected from draughts but well ventilated, and clean fresh water to drink. A laxative of Epsom salts, administered early in the outbreak, is sometimes beneficial. The dose would be a tablespoonful dissolved in a cupful of water. A light easily digested diet is indicated.

The sulfanilamide drugs, used according to directions, are highly efficient against pneumonia. A pneumonia bacterin or vaccine is helpful particularly where the disease tends to recur. One would also suspect, however, that housing conditions could be improved—see page 66.

## Rhinitis or Bull Nose

Rhinitis is an infectious disease caused by germs which attack the membranes and turbinate bones in the nasal chambers. In the early stages of the disease, usually noticed in small pigs, the symptoms are sneezing and sometimes bleeding from the nose. As the condition progresses the snout may show varying degrees of deformity, becoming wrinkled, turned upwards or twisted to the side—see Fig. 47. Affected pigs have difficulty in breathing and are often left stunted or unthrifty. Dry feeding will aggravate the condition by causing irritation in the nasal chambers.

There is no satisfactory cure for rhinitis. The disease can be eliminated from a premises by removing all infected pigs and their

littermates, which may be carriers of the disease. Since little pigs are most susceptible they should be protected against possible exposure.

The disease is almost invariably brought in to a swine herd by the introduction of an animal from a herd affected with rhinitis. Therefore it is important that all new additions come from rhinitis-free premises.

**Fig. 47.**—A twisted snout of a pig suffering from rhinitis. Sneezing and bleeding from the nose are usually accompanying symptoms.

## Swine Erysipelas—Arthritis

Erysipelas is a serious infectious disease of swine that is becoming more prevalent in Alberta. The germ that causes the disease is able to survive for long periods of time in contaminated yards and pens. Three forms of the disease are recognized and on occasion all forms may be observed in a single outbreak.

### Acute

This is a severe generalized form of erysipelas. It appears suddenly, affected pigs have a high fever, are prostrate and may die a short time after sickness is noticed.

### Chronic Arthritis

The chief characteristic of chronic erysipelas is arthritis. Affected pigs develop swollen enlarged joints. Some animals may die but usually they remain stunted and worthless. It can be differentiated from rickets by the fact that the disease will spread to other healthy pigs on the same premises.

### Diamond Skin Disease

This form of the disease is often mild, and is characterized by the formation of square or diamond shaped red-colored areas along the sides and back of the animal. These lesions eventually develop into scabs and slough off.

### Control

An erysipelas outbreak can be successfully controlled with swine anti-erysipelas serum or penicillin. Because of the seriousness of the disease, an owner should contact his local Veterinarian or obtain professional advice as soon as possible. Thorough cleansing and disinfecting are required to eliminate the infection from the premises.

## PARASITES OF SWINE

### Intestinal Round Worm

Swine suffer from both the lung worm and intestinal round worm. The common intestinal round worm is the one most prevalent in Alberta, and is the cause of substantial annual loss. The adult worm living in the intestinal tract causes irritation and damage to the intestinal wall, resulting in enteritis and unthriftiness. They also render the animal more susceptible to diarrheic infections by the damage done to the mucous membranes of the intestinal wall. The immature worms migrate through the lungs, and may cause extensive damage, resulting in pneumonia or a cough in young pigs. The worms then mature in the intestines.

Well fed, healthy swine sometimes carry worm infestation without showing any marked disturbance, a fact which again points to the advisability of proper feeding and management in disease prevention. However, parasites should not be tolerated. If they are not producing visible symptoms they are a constant threat and predispose the animal to other disease conditions.

### Control

For control to be logical it is necessary to know something of the life history of the parasite. The adults in the intestine lay numerous eggs which pass out with the manure, contaminating the soil, feed utensils and pastures. These eggs or ova are swallowed by animals with their feed and hatch into larval worms which, before becoming

established as adult worms in the intestine, migrate through the lungs and liver, causing extensive damage.

**Prevention and Treatment**

A study of the life history of the worm makes it easily understandable why sanitation is so necessary in the control of this parasite. Treatment alone, while it may destroy and remove most of the adult worms in the intestines, will not control the parasite.

One or two months before farrowing the sow should be treated for worms. The farrowing pen is cleansed and disinfected to remove all worms and larvae. A good disinfectant is made by dissolving one pound of lye in 30 gallons of boiling water. This is used while it is still hot. After farrowing, the sow and litter are moved on to clean ground, and every effort is made to keep the pigs from becoming exposed to ground and pasture contaminated with worm eggs from the manure of infected hogs.

There are several methods of treatment.

1. *Sodium Fluoride.*—Weigh the amount of grain or chop that is fed to the pigs in one day. To this is added one percent by weight of sodium fluoride. Care should be taken to mix it thoroughly, and it must be fed dry. Pigs may be given water to drink between meals. Care must be taken in measuring the sodium fluoride for it is toxic, and poisoning may occur. One-quarter pound of sodium fluoride to 25 lb. of dry feed will make a one percent by weight mixture.

2. *Phenothiazine.*—One regular feeding should be omitted prior to the dosing with this drug. The pigs are then penned in groups of four or five with the animals in each group as near to equal weights as possible. The phenothiazine is mixed with a grain slop at the rate of one-half tablespoonful per 100 pounds of pig. A serious defect of this treatment is that the animals cannot be allowed out in bright sunlight for several days after dosing as skin irritation will develop.

**Mange**

This is a contagious skin disease common in Alberta, caused by tiny mites that burrow into the skin. It is most prevalent in the colder seasons of the year and is more often observed in pigs kept in unsanitary surroundings.

Extreme itchiness is a marked symptom. Affected animals are constantly rubbing or scratching themselves. The lesions first appear as a redness or irritation of the skin around the nose, eyes and ears. The infection soon spreads along the neck and over the back and sides of the animal. As it progresses the skin becomes

wrinkled and dark colored. If neglected it can have serious effects leaving pigs stunted and unthrifty.

The application of oil or oil and sulphur mixtures will cure the condition. New commercial preparations containing benzene hexachloride, though more expensive, are highly recommended because of their efficiency. Treatment should be repeated at weekly intervals for at least three weeks. The pens must be thoroughly cleansed and disinfected. The hot lye solution mentioned on page 99 is effective.

### Lice

Lice are quite large and are usually quite evident when an animal is infested. They are blood suckers and cause a great deal of discomfort to the animal.

They are easily controlled by the application of oil with a brush. Raw linseed oil or used crankcase oil is effective.

## GESTATION TABLE FOR BROOD SOWS (based on 112-day pregnancy period)

| Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due | Date Bred | Date Due |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | Apr. | Feb. | May | Mar. | June | Apr. | July | May | Aug. | June | Sept. | July | Oct. | Aug. | Nov. | Sept. | Dec. | Oct. | Jan. | Nov. | Feb. | Dec. | Mar. |
| 1 | 23 | 1 | 24 | 1 | 21 | 1 | 22 | 1 | 21 | 1 | 21 | 1 | 21 | 1 | 21 | 1 | 22 | 1 | 21 | 1 | 21 | 1 | 23 |
| 2 | 24 | 2 | 25 | 2 | 22 | 2 | 23 | 2 | 22 | 2 | 22 | 2 | 22 | 2 | 22 | 2 | 23 | 2 | 22 | 2 | 22 | 2 | 24 |
| 3 | 25 | 3 | 26 | 3 | 23 | 3 | 24 | 3 | 23 | 3 | 23 | 3 | 23 | 3 | 23 | 3 | 24 | 3 | 23 | 3 | 23 | 3 | 25 |
| 4 | 26 | 4 | 27 | 4 | 24 | 4 | 25 | 4 | 24 | 4 | 24 | 4 | 24 | 4 | 24 | 4 | 25 | 4 | 24 | 4 | 24 | 4 | 26 |
| 5 | 27 | 5 | 28 | 5 | 25 | 5 | 26 | 5 | 25 | 5 | 25 | 5 | 25 | 5 | 25 | 5 | 26 | 5 | 25 | 5 | 25 | 5 | 27 |
| 6 | 28 | 6 | 29 | 6 | 26 | 6 | 27 | 6 | 26 | 6 | 26 | 6 | 26 | 6 | 26 | 6 | 27 | 6 | 26 | 6 | 26 | 6 | 28 |
| 7 | 29 | 7 | 30 | 7 | 27 | 7 | 28 | 7 | 27 | 7 | 27 | 7 | 27 | 7 | 27 | 7 | 28 | 7 | 27 | 7 | 27 | 7 | 29 |
| 8 | 30 | 8 | 31 | 8 | 28 | 8 | 29 | 8 | 28 | 8 | 28 | 8 | 28 | 8 | 28 | 8 | 29 | 8 | 28 | 8 | 28 | 8 | 30 |
| | May | | June | 9 | 29 | 9 | 30 | 9 | 29 | 9 | 29 | 9 | 29 | 9 | 29 | 9 | 30 | 9 | 29 | | Mar. | 9 | 31 |
| 9 | 1 | 9 | 1 | 10 | 30 | 10 | 31 | 10 | 30 | 10 | 30 | 10 | 30 | 10 | 30 | 10 | 31 | 10 | 30 | 9 | 1 | | Apr. |
| 10 | 2 | 10 | 2 | | July | | Aug. | 11 | 31 | | Oct. | 11 | 31 | | Dec. | | Jan. | 11 | 31 | 10 | 2 | 10 | 1 |
| 11 | 3 | 11 | 3 | 11 | 1 | 11 | 1 | | Sept. | 11 | 1 | | Nov. | 11 | 1 | 11 | 1 | | Feb. | 11 | 3 | 11 | 2 |
| 12 | 4 | 12 | 4 | 12 | 2 | 12 | 2 | 12 | 1 | 12 | 2 | 12 | 1 | 12 | 2 | 12 | 2 | 12 | 1 | 12 | 4 | 12 | 3 |
| 13 | 5 | 13 | 5 | 13 | 3 | 13 | 3 | 13 | 2 | 13 | 3 | 13 | 2 | 13 | 3 | 13 | 3 | 13 | 2 | 13 | 5 | 13 | 4 |
| 14 | 6 | 14 | 6 | 14 | 4 | 14 | 4 | 14 | 3 | 14 | 4 | 14 | 3 | 14 | 4 | 14 | 4 | 14 | 3 | 14 | 6 | 14 | 5 |
| 15 | 7 | 15 | 7 | 15 | 5 | 15 | 5 | 15 | 4 | 15 | 5 | 15 | 4 | 15 | 5 | 15 | 5 | 15 | 4 | 15 | 7 | 15 | 6 |
| 16 | 8 | 16 | 8 | 16 | 6 | 16 | 6 | 16 | 5 | 16 | 6 | 16 | 5 | 16 | 6 | 16 | 6 | 16 | 5 | 16 | 8 | 16 | 7 |
| 17 | 9 | 17 | 9 | 17 | 7 | 17 | 7 | 17 | 6 | 17 | 7 | 17 | 6 | 17 | 7 | 17 | 7 | 17 | 6 | 17 | 9 | 17 | 8 |
| 18 | 10 | 18 | 10 | 18 | 8 | 18 | 8 | 18 | 7 | 18 | 8 | 18 | 7 | 18 | 8 | 18 | 8 | 18 | 7 | 18 | 10 | 18 | 9 |
| 19 | 11 | 19 | 11 | 19 | 9 | 19 | 9 | 19 | 8 | 19 | 9 | 19 | 8 | 19 | 9 | 19 | 9 | 19 | 8 | 19 | 11 | 19 | 10 |
| 20 | 12 | 20 | 12 | 20 | 10 | 20 | 10 | 20 | 9 | 20 | 10 | 20 | 9 | 20 | 10 | 20 | 10 | 20 | 9 | 20 | 12 | 20 | 11 |
| 21 | 13 | 21 | 13 | 21 | 11 | 21 | 11 | 21 | 10 | 21 | 11 | 21 | 10 | 21 | 11 | 21 | 11 | 21 | 10 | 21 | 13 | 21 | 12 |
| 22 | 14 | 22 | 14 | 22 | 12 | 22 | 12 | 22 | 11 | 22 | 12 | 22 | 11 | 22 | 12 | 22 | 12 | 22 | 11 | 22 | 14 | 22 | 13 |
| 23 | 15 | 23 | 15 | 23 | 13 | 23 | 13 | 23 | 12 | 23 | 13 | 23 | 12 | 23 | 13 | 23 | 13 | 23 | 12 | 23 | 15 | 23 | 14 |
| 24 | 16 | 24 | 16 | 24 | 14 | 24 | 14 | 24 | 13 | 24 | 14 | 24 | 13 | 24 | 14 | 24 | 14 | 24 | 13 | 24 | 16 | 24 | 15 |
| 25 | 17 | 25 | 17 | 25 | 15 | 25 | 15 | 25 | 14 | 25 | 15 | 25 | 14 | 25 | 15 | 25 | 15 | 25 | 14 | 25 | 17 | 25 | 16 |
| 26 | 18 | 26 | 18 | 26 | 16 | 26 | 16 | 26 | 15 | 26 | 16 | 26 | 15 | 26 | 16 | 26 | 16 | 26 | 15 | 26 | 18 | 26 | 17 |
| 27 | 19 | 27 | 19 | 27 | 17 | 27 | 17 | 27 | 16 | 27 | 17 | 27 | 16 | 27 | 17 | 27 | 17 | 27 | 16 | 27 | 19 | 27 | 18 |
| 28 | 20 | 28 | 20 | 28 | 18 | 28 | 18 | 28 | 17 | 28 | 18 | 28 | 17 | 28 | 18 | 28 | 18 | 28 | 17 | 28 | 20 | 28 | 19 |
| 29 | 21 | .... | .... | 29 | 19 | 29 | 19 | 29 | 18 | 29 | 19 | 29 | 18 | 29 | 19 | 29 | 19 | 29 | 18 | 29 | 21 | 29 | 20 |
| 30 | 22 | .... | .... | 30 | 20 | 30 | 20 | 30 | 19 | 30 | 20 | 30 | 19 | 30 | 20 | 30 | 20 | 30 | 19 | 30 | 22 | 30 | 21 |
| 31 | 23 | .... | .... | 31 | 21 | ..... | ..... | 31 | 20 | ..... | ..... | 31 | 20 | 31 | 21 | .... | .... | 31 | 20 | .... | .... | 31 | 22 |